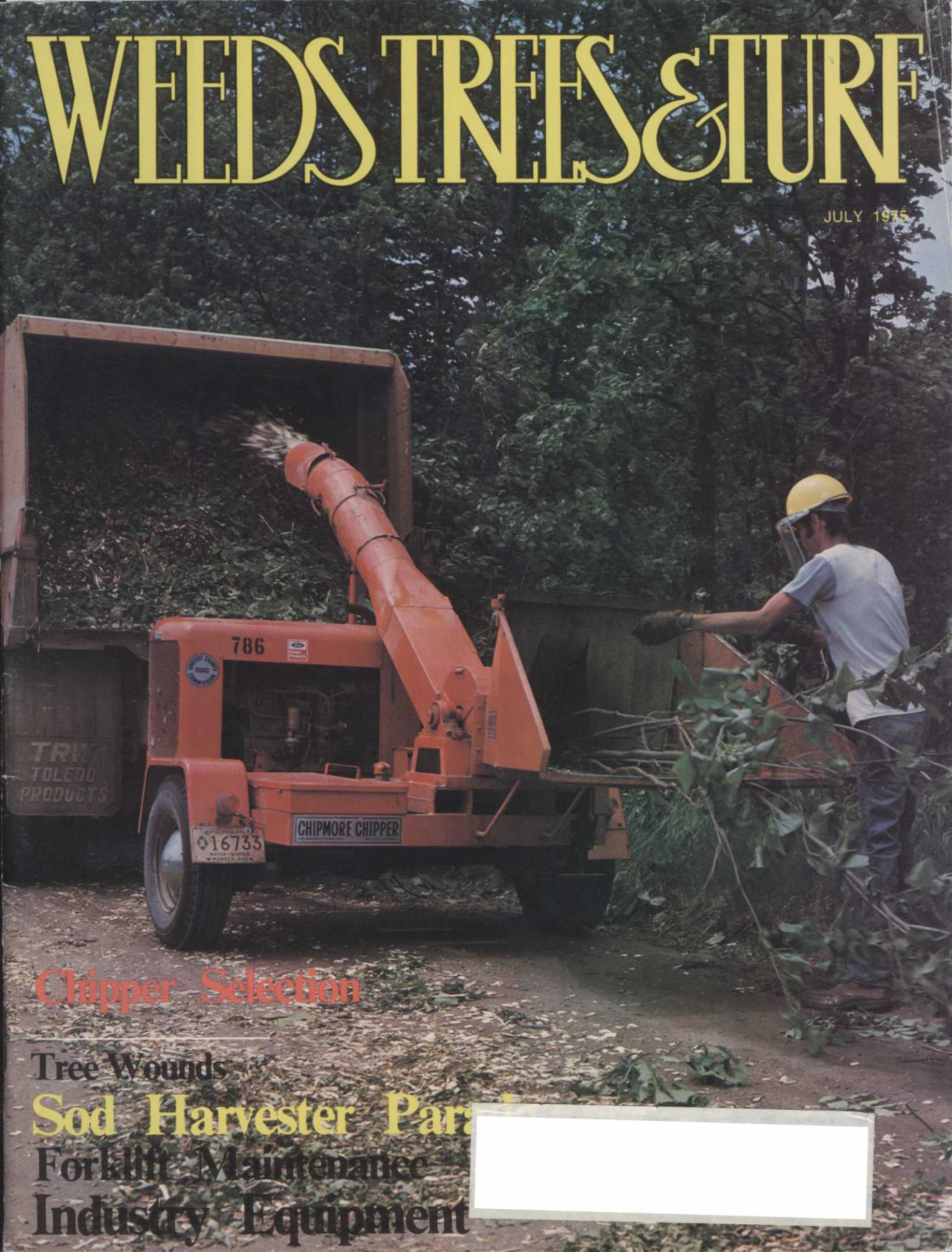
WEEDS TREES & TURF

JULY 1975



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Sod Harvester Par

Forklift Maintenance

Industry Equipment

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WEEDS TREES & TURF®

July 1975, Vol. 14, No. 7

14 **Buy A Chipper That Fits Your Needs** — A quick scan of the chipper market can often be confusing and misleading to the first-time purchaser. But a basic knowledge of construction characteristics and your particular chipper needs, can result in an economic and long lasting purchase.

16 **Association Profile** — July is WEEDS TREES AND TURF's annual Tree and Ornamental Care emphasis issue. For a special insight into the tree care business, we interviewed Robert Felix, executive secretary, National Arborist Association.

18 **Forklift Maintenance** — As rugged as they may seem, rough terrain forklifts need a special brand of 'tender loving care'. Proper maintenance schedules insures a sound running machine and delivers the goods.

20 **Anatomy of a Wound** — City street trees are especially vulnerable to wounding. And any wound can open the way to the complex processes that cause decay within the living tree. Tree expert, Alex Shigo takes a look at the various forms of wounds and describes workable treatments.

32 **Profitable Outlets for Wood Wastes** — Woodchips, once a waste material, are now being given a second look by a variety of commercial interests. Many municipalities and industries are utilizing chippers to reduce their wood waste to valuable chips which are selling for $15 to $40 per ton.

38 **What Role Do Trees Play In Cleansing the Air?** — Bruce Roberts and Alden Townsend, U.S. Department of Agriculture, examine one detrimental side effect of the energy demand in this country — air pollution from increased use of coal. Their study examines the potential of a variety of trees to clean the air.

Editorial 11
Government News • Business 12
Industry News and Newsmakers ... 26
Commercial Sod Industry 33
Meeting Dates 37
People on the Move 40
Industry Product Review 41
Classifieds 48
Advertisers 48
Trimmings 49

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THE COVER — Gratiot County Road Commission, Ithaca, Michigan, makes good use of a chipper as they clear a roadside of unwanted limbs, brush and other debris.

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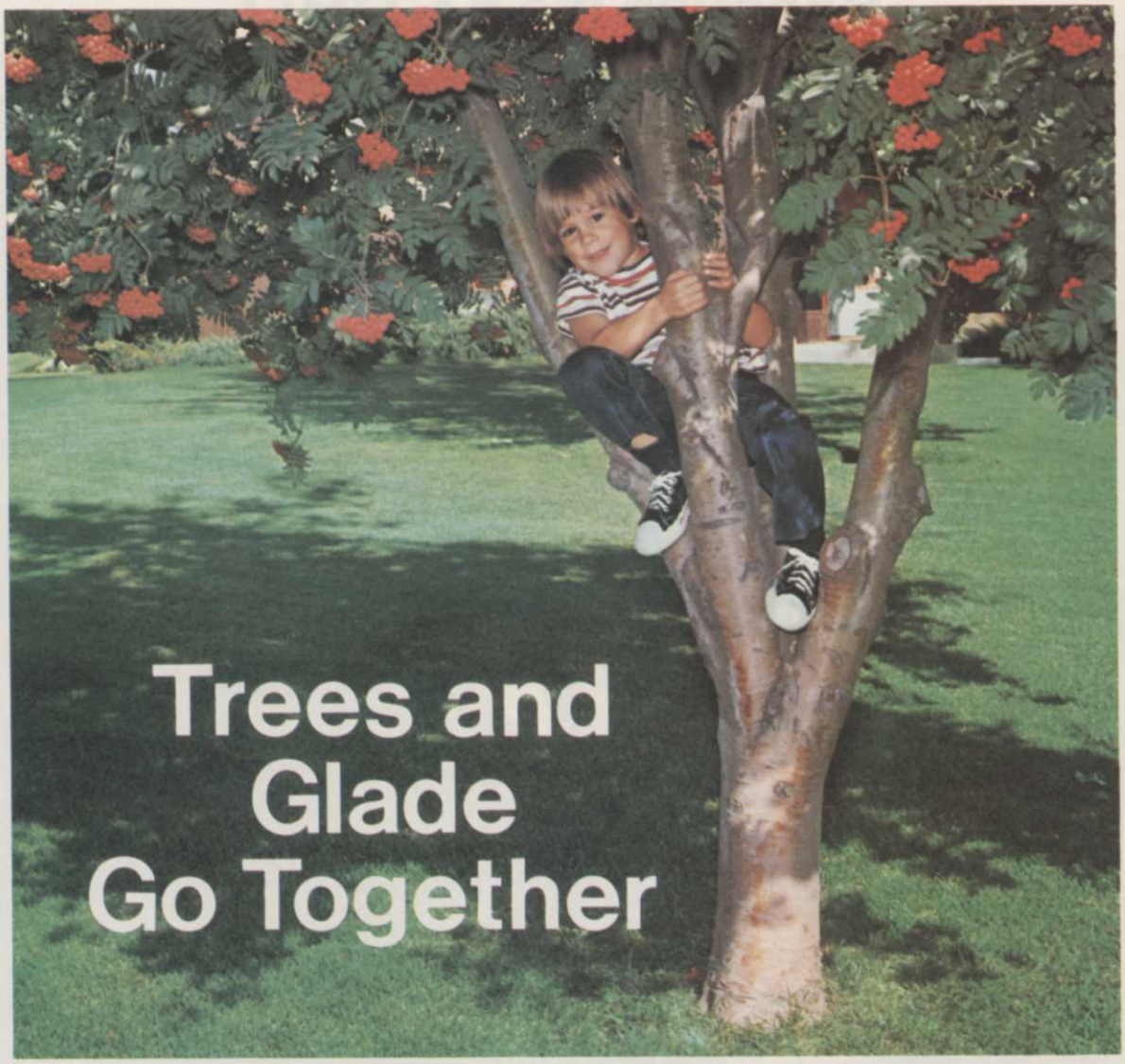

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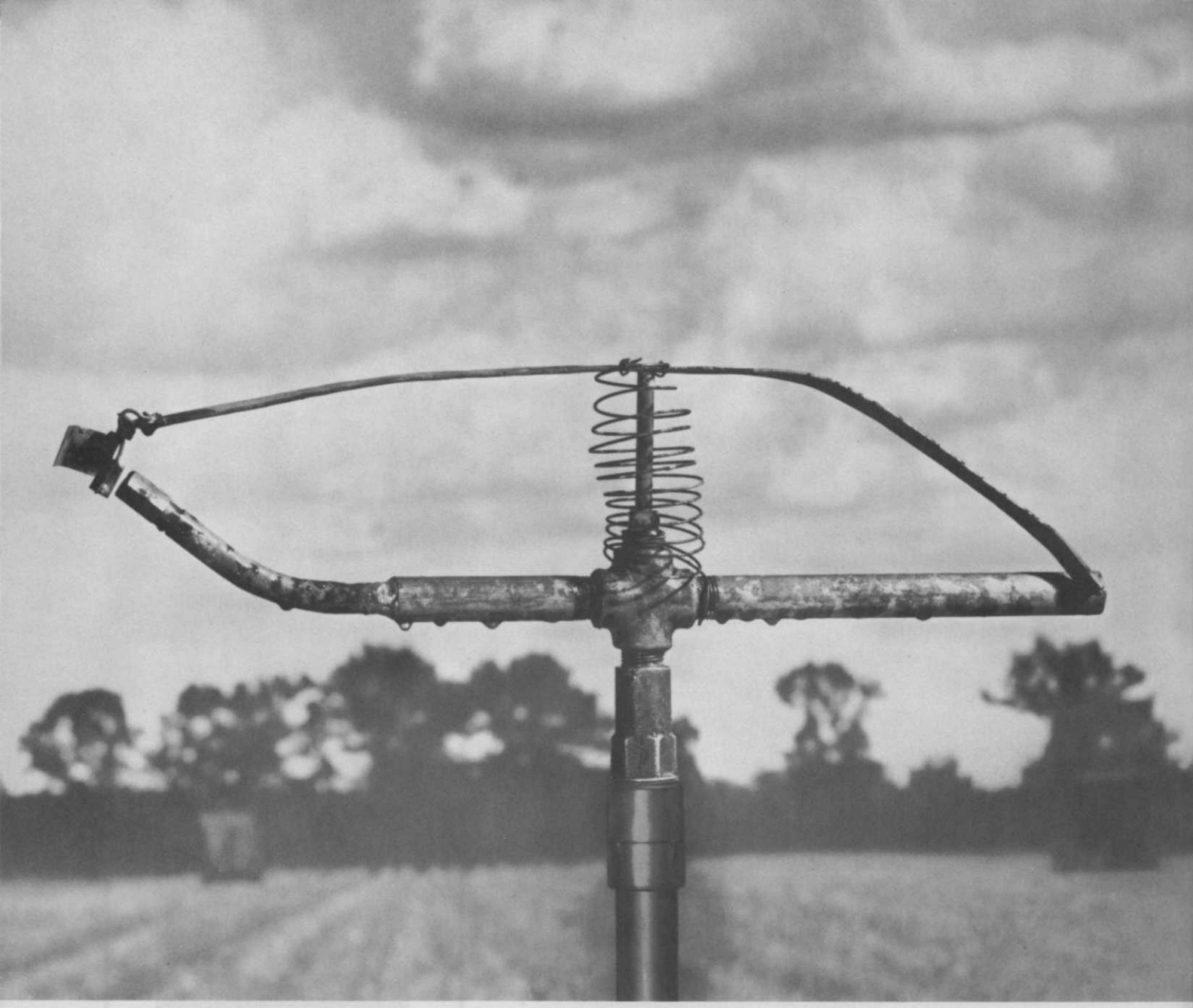

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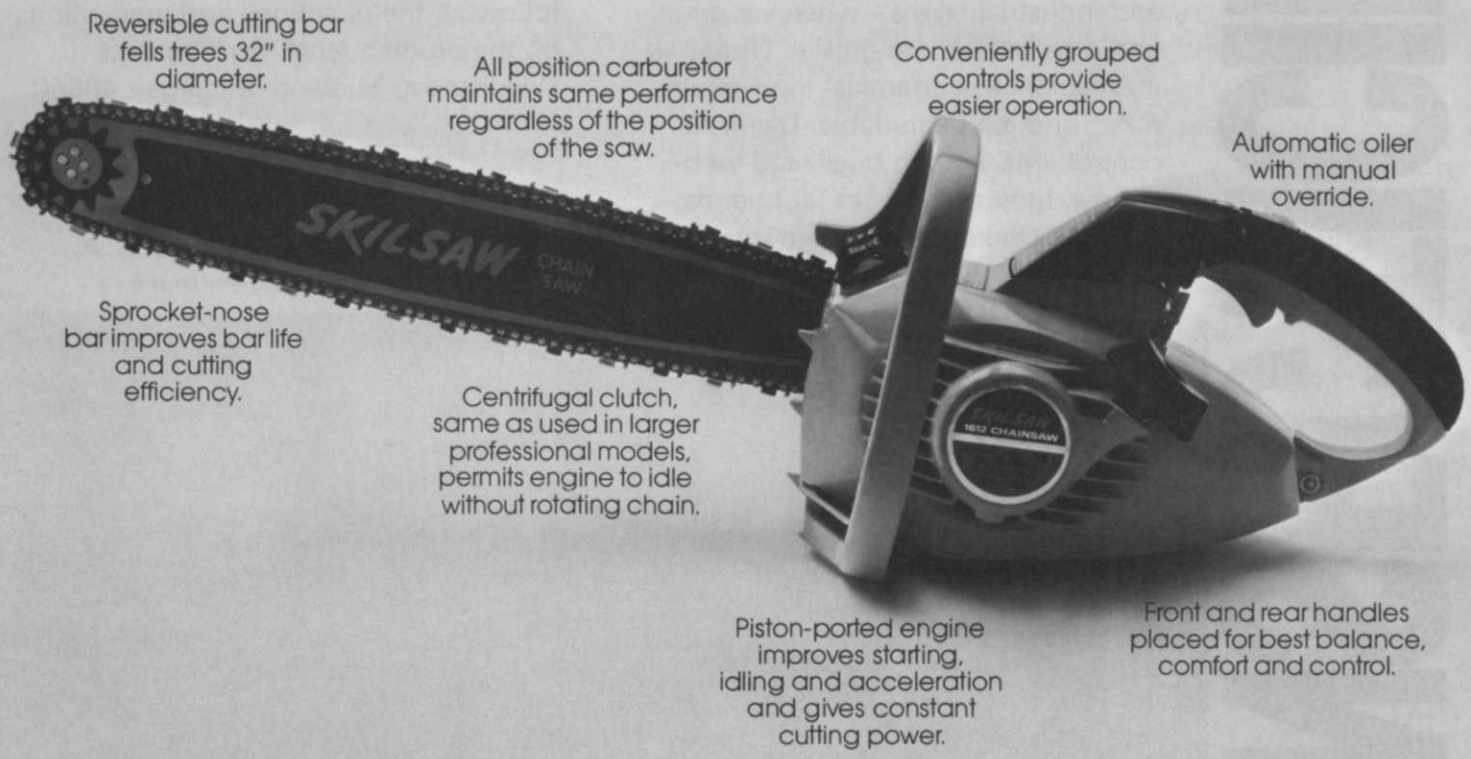

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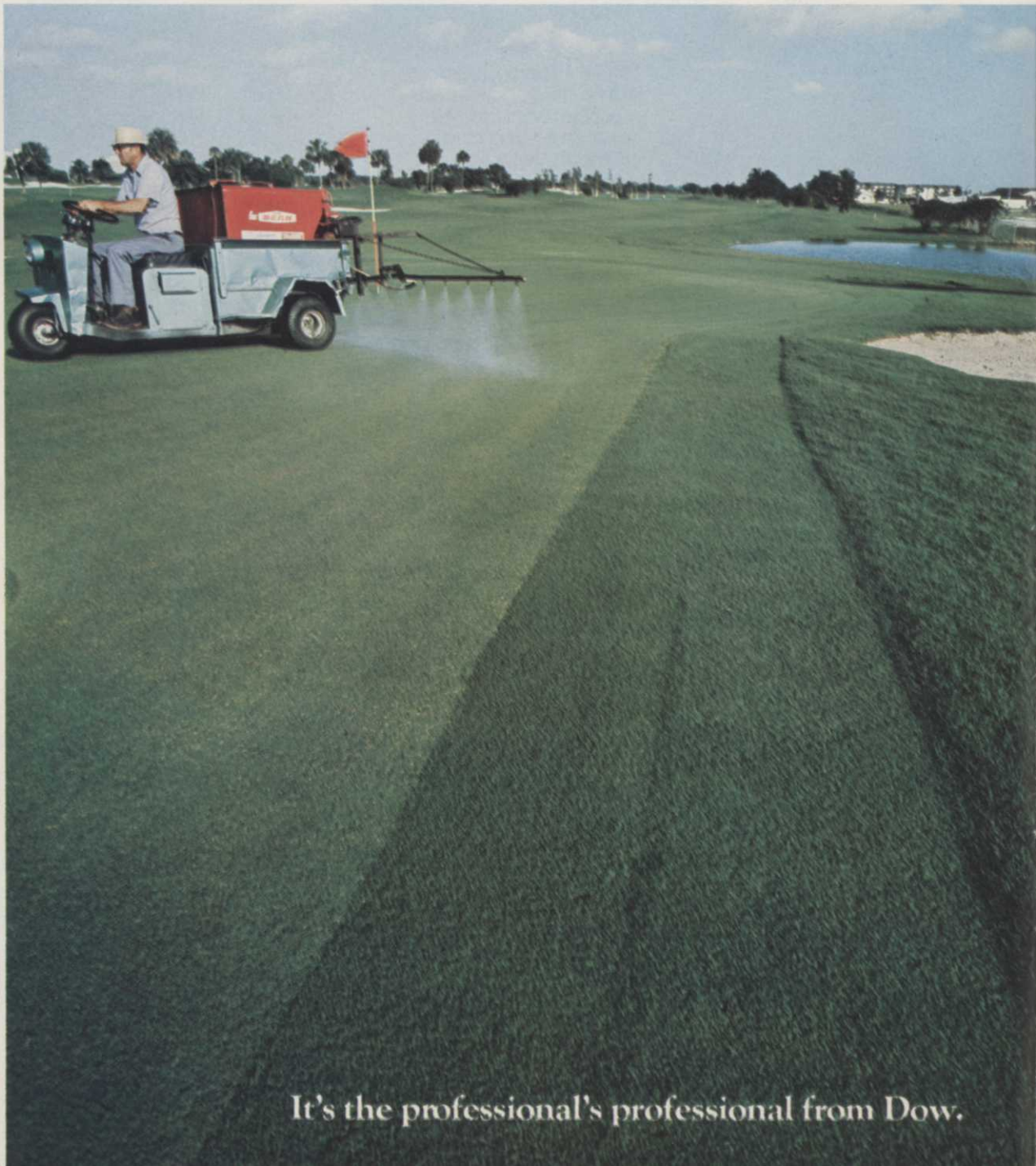

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Editorial

This Green Industry we serve has come of age. It is truly viable and recognized as such. Both commercial businesses and consumers recognize that professional service is available and while there are still many do-it-yourselfers, more and more segments of industry and consumers think custom service when they have problems.

Probably the greatest strides have been made among homeowners. Lawn service vehicles are commonplace in most communities. Tree care professionals have long enjoyed acceptance and recognition, but this is new for the custom lawn care professional. In the industrial sector, the labor organizations have been somewhat responsible for the turn to custom factory lawn care. Businesses often find the commercial operator does a better job for them at less money than if they maintained their own company union crews and equipped them properly.

Further gains can easily be made by cashing in on this accurred recognition value. Offering efficient and competent service alone does not always guarantee a thriving business. Many custom operators enjoy more business than they can handle, but this is not true of the majority nor is it likely to continue as this type business gains stature and more enter the field.

Thus the operator who advertises, promotes, and develops a public relations program will best be able to cash in on this market and build a stable and profitable business. No longer is the yellow page listing sufficient, though it is certainly a must in any program.

The time has come when direct mail to key prospects, advertising in local newspapers, and perhaps some TV and radio spots can pay dividends. Besides advertising, many opportunities exist, most of which call for more time than money.

Appearances on local radio and TV shows, and on civic programs builds image and gains business. Equally important is an acquaintance with the local garden editor, or at least with the newsperson who handles the green industry news. This editor can be alerted as to timing for the various practices which make up the business and at the time appraised of the need for professional consultation in critical areas where only the commercial operator should attempt the job.

As an industry, we know these ideas are not new. But we also know that many in our industry are not capitalizing on these money making areas of their business.

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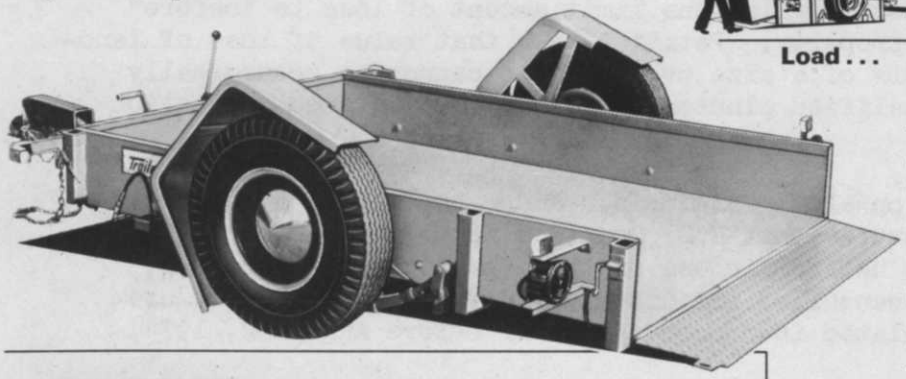
the hydraulic elevating trailer that moves your equipment easily from job to job.



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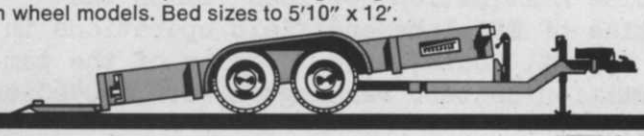

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◀ For ad on preceding page Circle 109 on free information card

Government News·Business

Advisory inspections and employer self-inspections, two new programs initiated by OSHA, are hoped to lead a more comprehensive national job safety and health program. OSHA boss, John H. Stender, told the Industrial Safety Equipment Association that early criticism of OSHA's program centered on the fact that, unlike many pre-existing state programs, OSHA did not have any provisions for inspection without citation. He said that self-inspections not only can help employers improve job safety and health conditions in their workplaces, "they also improve employee morale, contribute to productivity, reduce on-the-job injuries, lower insurance costs and provide many other benefits that more than pay for the time, effort and cost involved."

EPA and the Experimental Technology Incentives Program of the National Bureau of Standards have awarded a joint $300,000 contract to A. D. Little, Inc., Cambridge, Massachusetts to investigate Federal incentives for stimulating private industry research into new pest control techniques. Incentives to be studied include codified registration standards, Federal financial support, improved use of Federal laboratories, Federal insurance and other possible steps.

The Treasury Department has ruled that some electric golf cars imported into the U.S. from Poland have been sold at "less than fair value." The cars have been imported by Melex, U.S.A., Inc., Raleigh, N.C. David Bender, a U.S. Customs Service official, said the case now goes to the International Trade Commission (ITC). The ITC will conduct a three-month investigation to determine what injury, if any, has been suffered by the domestic golf car industry. A decision is expected by September 14, 1975. Clem W. Sharek, executive vice president of Melex, said the decision in no way means the cars will cease to be imported into the country, and that it is still up to the ITC to determine if dumping does exist. The investigation stems from a complaint filed March 14, 1974 by Cushman Motors Div., OMC Corp., Lincoln, Neb., manufacturers of Cushman golf cars.

Internal Revenue Service has been petitioned to change regulations regarding casualty loss of landscape trees and specimen plants by several Green Industry associations. Present regulations limit amount of loss to "before" and "after" value of entire property. Petition asks that value of loss of landscape trees or specimen plants of a size or type that cannot be economically replaced be determined by qualified plantsmen based on established evaluation formulas.

EPA says "case closed" on aldrin/dieldrin. Judge Perlman's "Accelerated Decision" on May 27, 1975, states that U.S. Court of Appeals for District of Columbia has found "imminent hazard" in use of these pesticides; therefore, these registrations will be cancelled immediately. However, sale and/or use of aldrin and dieldrin formulated into products on or before August 2, 1974, is still permissible.

A free pamphlet describing EPA's pesticide laboratory services open to other Federal, state and local government agencies is available from EPA. The 12-page pamphlet, entitled "Pesticide Examination Services" lists the biological and chemical test capabilities of EPA labs and field operations in Beltsville, Md., Corvallis, Ore., and Bay St. Louis, Miss. Copies of the pamphlet may be obtained from EPA's Information Center, Washington, D.C. 20460 or from any of EPA's ten regional offices.

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Buy a Chipper That Fits Your Needs

By KARL P. SCHOEPPNER, JR., Sales Supervisor, KPS Manufacturing, Bay City, Mich.

AFTER YEARS of spending a lot of money, time and labor to trim trees, cut brush, load it onto a truck, haul truckloads a day to the landfill, pay the smiling man at the landfill gate five to fifteen dollars a load, you've had enough. You've decided to increase your productivity, cut your labor costs, and generally improve your tree maintenance operation by getting a brush chipper.

You've seen a few around on various jobs, talked to a number of owners and found out that a chipper can, conservatively, reduce five to eight truckloads of brush and branches to one truckload of chips; free as many as four men for other work assignments; provide a good bio-degradable substance for soil structuring, weed control, ground cover and mulch. Having a chipper is also an easy way of avoiding the ever-increasing watchfulness of the EPA, which frowns on burning brush after a job is completed.

Once the decision to acquire a chipper is made, dig out that equipment guide copy of WEEDS TREES AND TURF. Nearly all of the chipper manufacturers are listed in it, so are their addresses. Drop them each a short note asking for literature, specifications, and the name of your nearest dealer. As this information is received, another decision must be made — which chipper, which engine, what kind of equipment should be on it.

The brush chipper you buy should be sturdily constructed of materials that can take a beating day after day without fatigue. Whether it must operate on city streets or open rights-of-way for power lines, the stronger the construction the better. A good rule of thumb is to pick a unit which has been produced for over five years.

Starting from the ground up, wheels should be 15 inches in diameter, semi-drop center truck type, with 7:00 x 15, 6 or 8 ply tires. These will afford maximum service at minimum cost, and are standard equipment on most machines. The running gear; axle, springs, etc. should be able to carry at least an additional one third of the total machine weight, thus allowing ample capacity for rough service, e.g. potholes, curbs, washouts, gullies, stumps, etc.

The transport, or trailer frame, should consist of structural materials, and be fabricated in such a way as to provide rigid support for the cutting unit and the engine, while allowing the vulnerable engine oil pan, fuel tank and wiring to be completely protected by the trailer frame itself. (Many operators have successfully towed their chippers to the job site over hazardous terrain only to find that the fuel tank or oil pan was somehow punctured during the trip.) A high trailer-to-ground clearance will add extra protection and provide considerable maneuverability on uneven, rocky or stump-covered ground.

While small, four-cylinder engines once powered the majority of brush chippers, 300 cubic inch, 6-cylinder and 330 cubic inch, V-8 gasoline engines are now the most common source of a chipper's power.

The six-cylinder engine is most often used by tree services and utilities. Its good torque characteristics, fuel economy, and long life are important features to consider if the chipper is to be operated under general conditions.

The eight-cylinder engine is more commonly used for heavy-duty requirements. Land clearing, slash removal, large and medium-sized municipal operations often need the extra power and torque this engine provides in situations calling for removal of considerable volumes of large limbs and brush.

Because conditions vary, it is sometimes difficult to determine which engine is correct for a particular application. In many instances the dealer or manufacturer can offer valuable suggestions and assistance which could eliminate the inconvenience of having an overpowered chipper.

The device which performs the actual cutting or chipping of the wood is subject to a variety of names: cutting cylinder, rotor, cutting head, or chipping head. Most cutting cylinders are available in two basic widths, 12" and 16", but their diameters generally range from 11½" to 16". Chippers with 12" wide cutting cylinders are commonly used for light to medium maintenance work, and are usually powered by 300 cid 6-cylinder engines. The 16" wide cutting cylinder, when driven by a 6-cylinder engine, is ideal for light, medium, and some heavy work. When driven by a 330 cid V-8 engine, the 16" cutting cylinder is well-suited for removals and heavy trimming, as well as light pick-up work. A 12", 6-cylinder chipper should not be used to reduce 6-inch limbs, and, conversely, a 16", V-8 should not be used strictly to chip 2-4 inch branches. A little time spent analyzing the work to be performed will usually result in matching the machine to the general type of job.

All cutting cylinders have a number of removable knives to perform the task of chipping wood. The most widely used system consists of 4 knives, which are usually the full width of the cutting cylinder (straight knife system), and are held positively in place by 4 full-length wedges through which several high-strength bolts are put, to firmly draw the wedges against the knives on one side, and against the cylinder on the other, preventing their coming loose. At least two knife and wedge configurations include a back-up system utilizing a tapered knife which is wider at its bottom

(continued on page 22)

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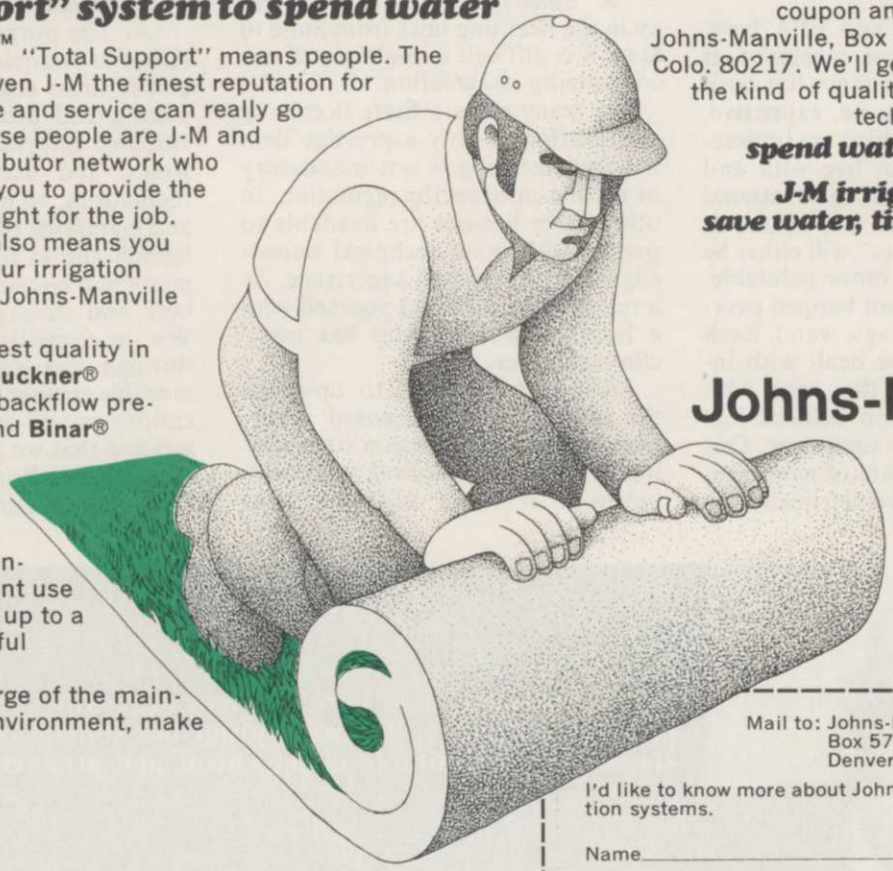

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Association Profile

An Interview With Robert Felix, Executive Secretary, National Arborist Association

WTT. Bob, in the May issue of WEEDS TREES AND TURF you indicated in the Guest Editorial column that the tree care market is in some instances dwindling. What is the future of the industry?

A. As long as we have urban forests owned by private homeowners, institutions, commercial properties and government we will have practicing, successful commercial arborists. As a result of the monumental concern about our environment, everyone has become interested in the preservation of our trees. As economic conditions permit our markets will grow.

WTT. What effect have Federal Regulatory bodies, such as OSHA and EPA, had on the commercial arborist?

A. Both OSHA and EPA have made tree men more conscious of safe practices. Compliance has been and will continue to be, expensive. Those regulations which are impractical will be hard to live with and through the efforts of the National Arborist Association and others in the "Green Industries" will either be rescinded or made more palatable. However, this will not happen overnight by waving a magic wand. Each issue will have to be dealt with individually as was the case with OSHA and the nylon ballistic leggings for chain saw operators. Our best bet is to be aware of new regulations and if they are detrimental to the industry make them compatible before the fact and not after. The National Arborist Association is helping to do this with increasing frequency. Our comments on proposed regulations are receiving proper consideration, have been published in the Federal Register and have even been solicited.

Many tree men complain about being regulated unfairly and rightly so, but when we ask for support in the way of letters to congressmen, agencies, governors or anything else they absolutely bury their heads. Like it or not, regulations, certification and safety requirements have done a great deal to up-grade our industry.

WTT. What about State Licensing laws for arborists?

A Since there is little consistency in the licensing laws from State to State it is difficult to make an all encompassing observation.

In many cases a State license or certification is only a prestige item because licensing is not mandatory or no one enforces the regulation. In other cases licenses are available to people with good technical knowledge and no practical experience. As a result you could find yourself with a licensed arborist who has never climbed a tree.

Although intended to up-grade the industry, many licensed arborists consider certification or licensing as a means of dealing with competition. If State licensing laws could achieve some degree of uniformity, be awarded to those who have demonstrated a technical as well as practical knowledge and could be policed they would have much more impact.

WTT. Is the typical commercial arborist a better business man today than he was 25 years ago?

A. Very definitely. The pendulum has swung the other way. In most cases today's commercial arborist is not only a technically proficient tree expert but a sophisticated businessman, utilizing all of the modern business techniques available to him. This is as true of the small operation as well as the large. Electronic data processing is now being used by a number of commercial arborists to perform accounting functions. Electronic typewriters hammer out direct mail solicitations, automatically typed for each customer, two way radios expedite service and everybody is cost conscious.

WTT. What is the role of the National Arborist Association in the tree care industry today?

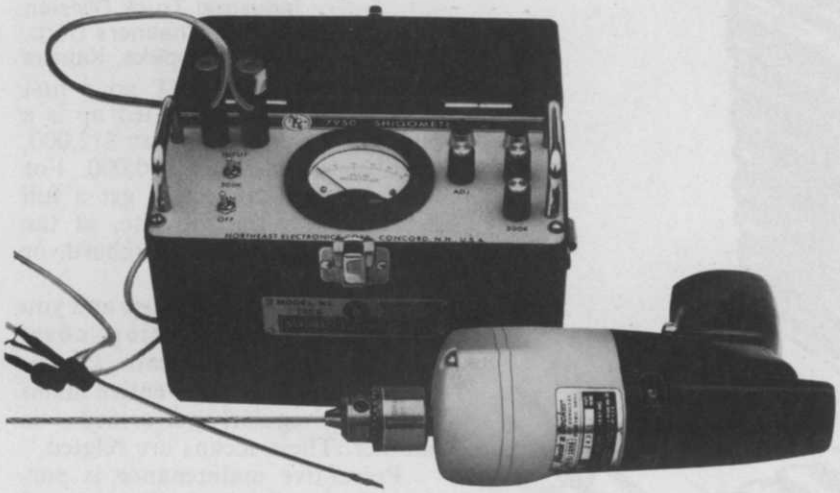
A. The purpose of the National Arborist Association is to bring together firms engaged in the field of commercial arboriculture to share valuable information; to encourage sound and useful legislation and regulations, to maintain good ethics and standards of practice in the profession and to foster a spirit of harmony and cooperation among members and throughout the industry. We accomplish much of this through our annual meeting, our monthly newsletter and other publications as well as the many member services that we provide such as our Home Study Program. In addition I

(continued on page 25)

Robert Felix

"It is imperative, if we have any hope of creating and maintaining a professional image, that we upgrade our standards and meet those standards with suitable management and production practices."

NEW ELECTRONICALLY ACCURATE TREE AND POLE DISCOLORATION & DECAY DETECTION



A practical, low cost instrument that pinpoints discoloration and decay in their early stages before they are evident externally. Allows time for early treatment or removal before damage to surrounding area. Ideal for utility pole, park, and recreation area maintenance, and forestry research and inspection.

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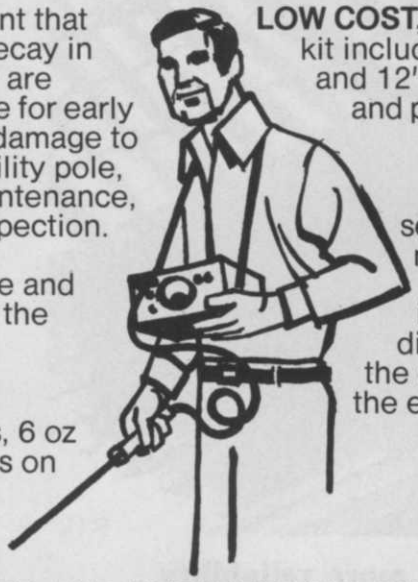

LOW COST, BATTERY OPERATED Complete kit including Shigometer, two 3/32" bits 8" and 12" long, four 8" and two 12" probes, and portable, cordless drill $414.95. Kit without drill $350.00.

The Shigometer is an extremely sensitive instrument that accurately measures any amount of ionization to provide detection of both incipient and advanced decay and discoloration. Shigometer indicates the degree of tissue deterioration and the extent of tissue damage. Complete instruction manual and 12 month warranty included with each Shigometer.

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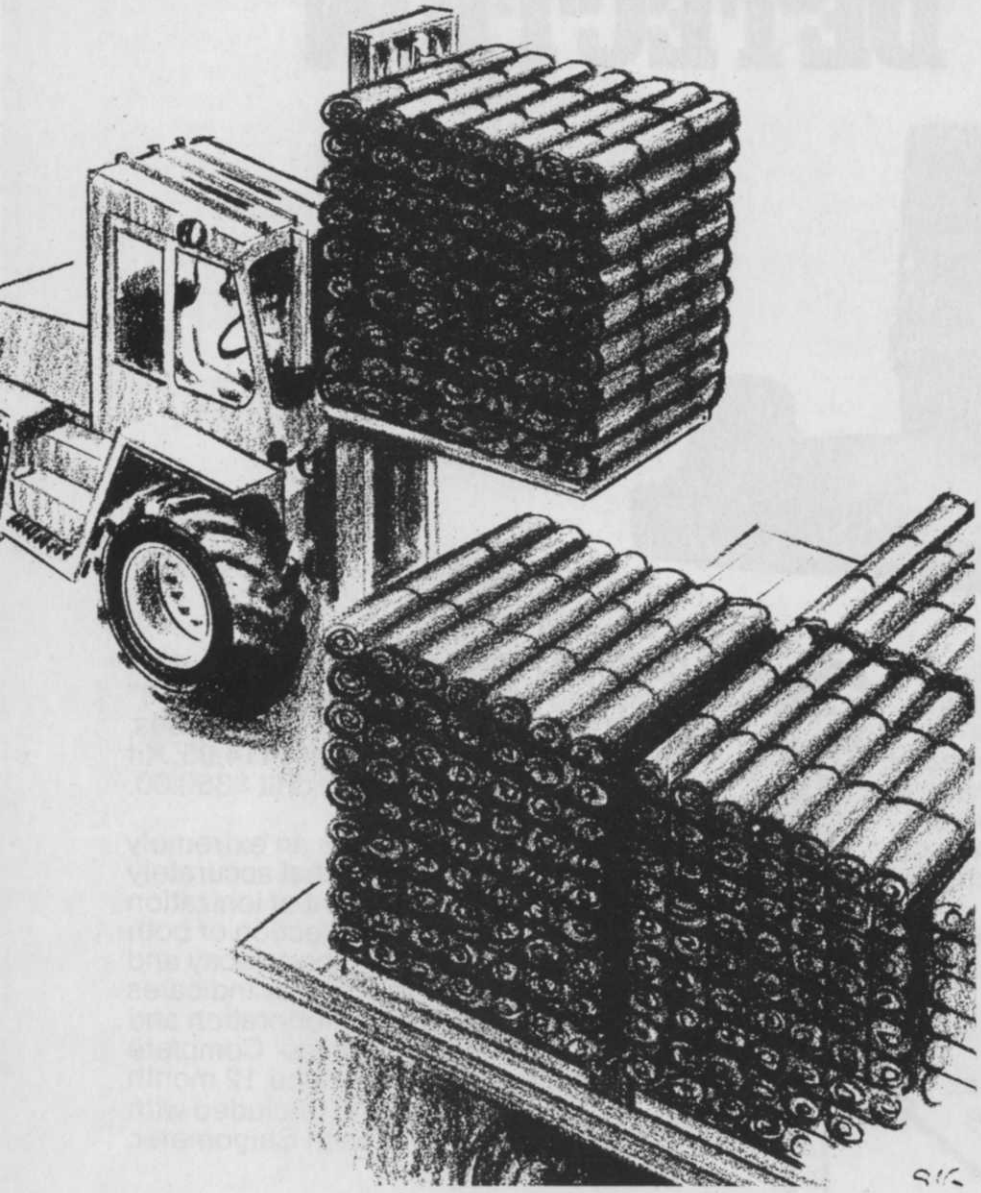

Modern designs build more reliability into these big-tire vehicles; Maintenance delivers goods.

By CURT SCHMIDLER
Senior Service Instructor
Industrial Truck Division
Allis-Chalmers Corp.
Topeka, Kansas

YOU'VE BOUGHT your first rough terrain forklift. Tied up is a purchase price of at least $12,000, possibly as much as $30,000. For that price you expect to get a full day's use on the job site, at the lumber yard, saw mill, orchard, or sod farm.

You can get this full use and you can conserve operating costs through a variety of means. Operator training is one, preventive maintenance — regularly performed — is another. These means are related.

Preventive maintenance is particularly helpful in budgeting and forecasting of operating expenses, because the problem with rough terrain forklifts, historically, is operating costs. One reason is operation: light construction users go to considerable effort to hire experienced dozer, loader and backhoe operators, but often anybody who can start a forklift is allowed to use it. Another reason is improper service: owners send their mechanics to manufacturers' schools, learning how to take care of big construction machinery. In contrast, almost no one trains a forklift mechanic. Unskillful operators and mechanics really can create excessive operating costs, primarily in the form of excessive machine downtime.

Why people are so casual about caring for this equipment isn't certain, other than rough terrain forklifts are basically similar to the common tractor. Therefore, many owners may feel "everybody knows how they operate."

A second possible reason is related to the intense use of these machines: unloading materials. A truck

(continued on page 29)

There was no sleeping on the job in the creation of a MAN MADE bluegrass!

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ADELPHI has been chosen by the Plant Variety Protection Office, U.S.D.A., as A STANDARD FOR DARK GREEN COLOR to which all bluegrasses applying for plant protection will be compared for color classification.

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ANATOMY OF A WOUND

How City Trees React . . . How They Can Be Helped

By Alex L. Shigo and Edwin vH. Larson
Respectively, Chief Plant Pathologist and Editor,
Northeastern Forest Experiment Station, Forest Service, U.S. Department of Agriculture

CITY TREES are especially vulnerable to wounding. They are wounded by automobiles, garbage trucks, lawn mowers, snow plows, construction equipment, people, birds, insects, animals, fires, ice, and storms. Few city trees reach maturity without receiving many wounds.

Any part of a tree can suffer wounds: roots, trunk, branches. Trunk wounds — such as those made when a skidding car gashes the side of a tree — are easy to see. Root wounds may be hidden. Many young trees are wounded during planting, and the wounds may be covered with soil.

Yet the most common and most serious wounds on city trees usually go unnoticed — branch stubs. All trees lose some branches during their lifetimes. After a windstorm, you may see broken branches lying on the streets; but you won't see where they came from. The stub or open scar that remains after a branch is broken off, dies from natural causes, or is pruned improperly, is a serious wound.

And any wound can open the way to the complex processes that can cause decay within the living tree. Even the wounds made by an insect or a nail driven into a tree could be serious.

If a tree is vigorous, the wound will heal rapidly. But if the tree is not vigorous, the wound will heal slowly. Then trouble starts for the tree: wood-inhabiting microorganisms get into it.

How Trees React

Trees respond to wounds in unique ways. After a tree is wounded, its defense system goes into action. First it forms chemical barriers in the wood behind the wound to prevent infection by microorganisms. These barriers stop most wood-inhabiting microorganisms most of the time. The wound then heals.

But in other cases, some aggressive wood-inhabiting microorganisms may get through the protective chemical barriers. Then the tree has another line of defense. The injured cambium produces a zone of special cells, a barrier zone that seals off — compartmentalizes — the wood that is infected by microorganisms. The sealed-off compartment is usually a column, no larger than the tree at the time it was wounded. The microorganisms may spread up and down within this compartment, causing the wood to discolor and decay; but they do not spread sideways into the new wood that formed after the tree was wounded.

The result is like a tree within a tree: the old infected tree inside, sealed off from the new tree around it, which year by year puts on new growth rings of healthy wood. So wounds on a tree do not always spell doom. If the young tree is kept vigorous, it will compartmentalize its injury and continue to grow.

But if the tree is wounded again, and again, and again, new compartments will form each time to seal off the infected wood. In time, a complex of infected compartments may so weaken the tree that it succumbs to other destructive forces.

Successions of Microorganisms

Many species of microorganisms are involved in the decay process: bacteria, non-decay fungi, and decay fungi. They infect wounds in a wave action. One group of microorganisms follows another, and each group launches its invasion force against the defense forces of the tree, as all are affected by an ever-changing environment.

Dissection of a healed branch stub on a paper birch tree. The decay microorganisms are compartmentalized within the tissues that were present when the branch died. When dead and dying branches are pruned properly, the wounds heal rapidly and the spread of decay is minimized.

And microorganisms react to each other. One kind may open the way for another kind to invade the tree. Or one kind may block another from infecting the tree.

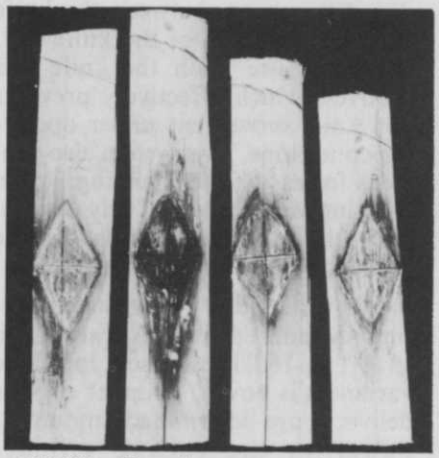
It takes time for microorganisms to get established in a tree. This gives us time to help the tree after it has been wounded. We know now that it is possible to disrupt the successional pattern of destructive microorganisms by purposely infecting the wound with another fungus. This stalls the decay process and gives more time to help the tree.

So what do you do for the tree? One thing you should not do is smear some wound dressing on the wound and forget it, thinking you have done all you can to help the tree. Wound dressings do not stop decay.

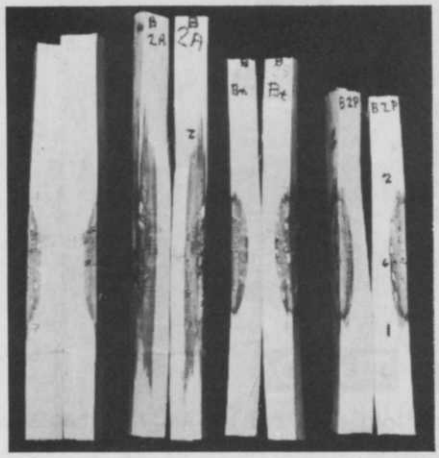
After a tree is wounded, you should remove the injured wood and bark with a clean sharp knife, so

that healthy bark is in contact with sound wood at the margins of the wound. Usually this means enlarging the wound, in the shape of a lens.

Then do everything possible to increase the vigor of the tree. Properly prune dead and dying branches; fertilize and water the tree; and thin out less valuable competing trees. After all these steps



ABOVE: Four 1-year wounds on a red maple tree after treatment with wound dressings. Left to right: untreated; asphalt-base dressing; orange shellac; and polyurethane varnish. BELOW: Dissection of wounds shown above reveals discolored wood. Studies of 160 wounds on 40 red maple trees after 4 years indicated that none of the wound treatments reduced the amount of discolored and decayed wood.



A wound on the base of a red maple tree. Trees do not repair or replace wood injured by wounds. The injured wood is walled off or compartmentalized. After a tree is wounded, help it to help itself by doing everything possible to increase its vigor. This will bring about faster compartmentalization of the injured wood.

have been taken, you can apply some wound dressing — only to indicate that someone has treated the tree.

Too often people think that trees are so big and strong that they can withstand anything. Not so. The wounding of city trees is a serious problem now, and it will get no better unless something is done. One thing we can do is to develop sound tree-maintenance programs, using new information and new tools that have come from recent research on wounds and decay.

Selected References

The processes that lead to discoloration and decay within living trees are complex. Research is still being carried on to better our understanding of these processes. For more technical details, we suggest the following publications:

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Shigo, A. L., and W. E. Hillis. 1973. Heartwood, discolored wood, and microorganisms in living trees. Annu. Rev. Phytopathol. 11: 197-222.

Shigo, A. L., and E. vH. Larson. 1969. A photo guide to the patterns of discoloration and decay in living northern hardwood trees. USDA For. Serv. Res. Pap. NE-127. 100 p., illus. Northeast. For. Exp. Stn., Upper Darby, Pa.

Shigo, A. L., and A. Shigo. 1974. Detection of discoloration and decay in living trees and utility poles. USDA For. Serv. Res. Pap. NE-294. 11 p., illus. Northeast. For. Exp. Stn., Upper Darby, Pa.

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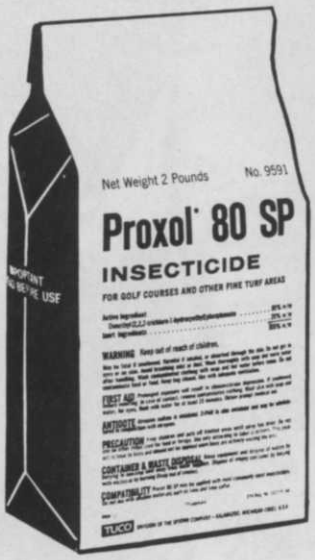
CHIPPER *(from page 14)*

and a wedge which matches the taper of the knife. As the wedge is drawn down by its bolts, the flat side of the knife is pushed against the cutting cylinder, and the tapered side is locked against the wedge with no means of escape. Most of the above systems are resharpenable, adjustable and easily changed. Adjustments after sharpening are usually made by increasing the height of two setscrews beneath each knife, until proper clearance from the cutting bar is obtained.

Several other knife systems are also offered. One uses 12 or 16 individual knives, firmly secured with wedges. This system places its knives in a staggered pattern around the cutting cylinder; the knives are sharpened on both ends and are easily changed. Another straight-knife design has V-grooves cut in the back of the knife which match grooves cut into the cutting cylinder. Gib screws, between the knife and opposite side of the knife slot, exert pressure upon the knife and grooves, which effectively prevents any knife movement under operating conditions. This system also provides for easy knife changing. When working with knives of any system, it should be understood that they be handled with a cautious attitude.

As previously mentioned, cutting cylinder diameters vary from 11½" to 16."The reason for these variances is power. Chipper engines deliver a pre-determined amount of power to the cutting cylinder through a V-belt drive, with very little difference among competing ma-

Take the guesswork out of turf insect control



Diagnostic Aid from TUCO

Many turf insect larvae are night feeders, so the first evidence of their activity frequently is damaged turf. Diagnostic Aid, applied to turf as directed, causes insects to emerge to the surface within 10 minutes. They can be identified and counted to determine the level of infestation and whether an insecticide should be applied. It also can be used after insecticide application to measure the control obtained.

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Proxol is the one insecticide developed especially for use on fine turf and ornamentals. Sod webworms and cutworms are two major groups of turf insects controlled by Proxol. It is estimated that each sod webworm larva can chew up 20 square inches of turf in its average life span of 20 to 40 days; the cutworm larva can devour up to 36 square inches. With 300 to 500 larvae generated from each adult in a period of 10 to 21 days, it becomes apparent why early detection and control are desirable. Using Diagnostic Aid and Proxol together lets you program insect control.

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One bottle of Diagnostic Aid FREE in each case of Proxol 80 SP.

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TUCO Division of The Upjohn Company, Kalamazoo, Michigan 49001

chines, since the same engine sizes are used by most chipper manufacturers.

Several machines on the market utilize a small diameter (11 ½") cutting cylinder, which does not, of itself, have enough weight to maintain the power required when chipping medium or large-size limbs. To increase this cutting cylinder's power, a large weight, called a flywheel, is attached to one end of the cutting cylinder's shaft. As the unit reaches its optimum operating speed, the flywheel acts as additional mass added to the cutting cylinder and supplies extra power to complete the chipping process.

An alternative approach to the above method of construction is found on a number of chippers. Instead of having a small-diameter cutting cylinder and a flywheel, a larger diameter (14-16 inches) is used. The torque required to successfully complete the cutting process is within the cutting cylinder itself, thus accomplishing an objective — all of the weight needed for cutting is safely placed directly behind each knife, allowing maximum power from the engine with less recovery time, and maximum power usage because the full amount of weight required is behind each cut.

Wood, once it is chipped, must be removed from the chipper as quickly as possible to accommodate more wood being fed in. This phase of the operation is usually done in one of two ways — with a separate fan-type blower attachment, or by the integral blower action of the cutting cylinder itself. Most small-diameter cutting cylinders can discharge chips from medium diameter branches through their own integral speed, at a restricted distance, but require extra assistance with heavy foliage, small branches and large limbs due to a low peripheral speed. This extra assistance is usually supplied by a fan-type blower attached to the chipper shaft after the flywheel is mounted. The blower provides a considerable amount of air movement which aids the chip movement initiated by the cutting cylinder's rotation, and will, in most situations, eliminate chip build-up in the discharge chute.

Most large-diameter cutting cylinders have a high peripheral

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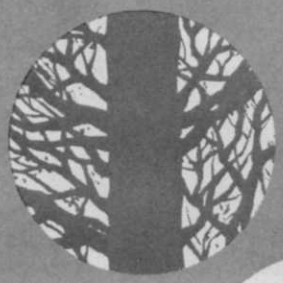
speed, which imparts the actual mass, or weight, and speed of the cutting cylinder to the chip itself. Thus, for a few seconds, the chip has the same weight and speed of the cutting cylinder which creates an integral blower action. This power carries the chip out the discharge chute in most situations, whether large, medium or small material is fed into the chipper. A satisfactory discharge distance is obtained with the large-diameter cutting cylinder, while chip build-up in the discharge chute is held to a minimum. The most efficient means of discharge with a large cylinder is made with the use of a seal bar to provide maximum removal of chipped material.

Material to be reduced is introduced to the cutting cylinder by means of a feed chute located at the rear of the machine. Feed chutes are also referred to as feed tables, feed platforms or feed aprons, and are available in two configurations — straight and folding. The straight feed chute design is best suited for applications not requiring a great deal of maneuverability, such as

A chipper can, conservatively, reduce five to eight truckloads of brush and branches to one truckload of chips; free as many as four men for other work assignments; provide a good bio-degradable substance for soil structuring, weed control, ground cover and mulch. But purchasing an over-or-under-powered unit or one not heavy duty enough for your type of work can result in just as many negative aspects.



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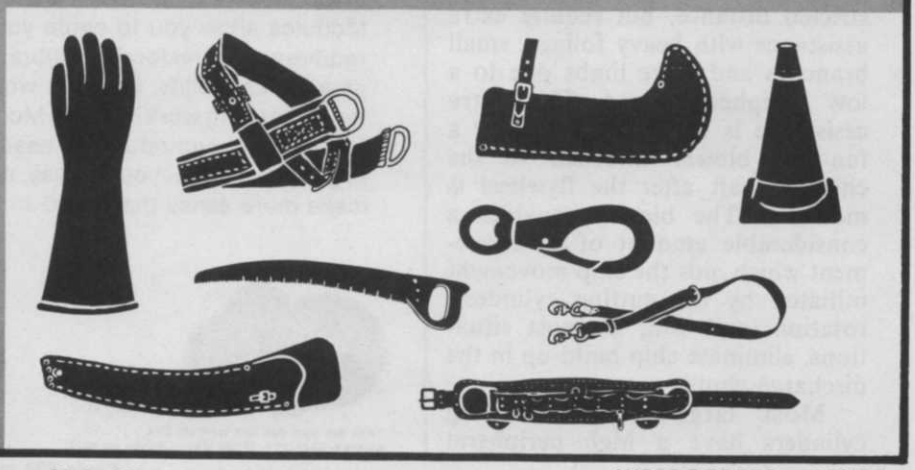

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right-of-way maintenance, street trimming, or street pickup. The folding feed chute design has gained in popularity because it can be folded in half, creating an effective barrier against vandalism and urban trash accumulation in the feed area of a parked chipper. The folding feed chute, when closed, reduces the overall towing length of the chipper by about 30 inches, allowing for more maneuverability in tight areas.

Feed chute bottom, top and sides are required by OSHA to be designed to prevent operator contact with the cutting cylinder, knives, or blower blades under normal operating conditions. It is the equipment owner's responsibility to insure that his equipment is in good condition and compliance with these standards. It is the operator's responsibility to use the machine in accordance with national, state, and local safety standards, as well as the manufacturer's recommended operating methods.

Once the wood is past the feed chute, and through the cutting cylinder, it is exhausted by means of a discharge chute, which is available in two designs — straight or round. The straight discharge chute will place chips in one direction — straight ahead, but usually incorporates a deflector, or bonnet, at its far end to direct the chip flow up or down. Some straight chutes are available with an attachment for directing chip flow to the right or left as well.

Round discharge chutes are designed to allow the chip direction to be quickly and easily changed from straight ahead to any position within 360°. They also include an adjustable bonnet and the added feature of being adjustable for height, to allow for varying chip box heights when one chipper is used with several trucks.

All chippers' discharge chutes will plug up with material at one time or another, for a variety of reasons. The most common reasons are incorrect engine RPM (running too slow), worn throttle controls, improper engine governor and linkage maintenance, incorrect angle used when knives are sharpened, dull knives or worn cutting bar. Nevertheless, a plugged chute is an inconvenience, and most chipper manufacturers have made provisions for cleaning out their discharge chutes. Some chutes have hinges in the middle and can be folded back for cleanout. Others have an access door in the side which is simply opened to remove whatever has caused a problem. Access doors can also be used to inspect knife condition without having to use wrenches or other tools. In the interest of safety, it is strongly recommended that no maintenance work be performed on any chipper until the engine is shut off, key removed, and the cutting cylinder has come to a complete stop.

In the final analysis, it should be pointed out that all brush chippers will chip wood. It is, however, to the buyer's advantage that he be aware of the chipper which is best suited for his needs. There are high-production and low-production chippers; long-life and short-life chippers; and, of course, expensive chippers and less expensive chippers. Of the wide selection of brush chippers on the market today, the potential buyer can be assured of finding several makes which will prove to be inexpensive, low maintenance, long-life and high-production machines.

PROFILE *(from page 16)*

travel around the United States attending meetings, visiting member companies and collecting ideas for redistribution to the rest of the membership. I also stay on top of the Washington scene and represent our membership there.

Therefore our role is to see to it that our members are the most well informed, up-to-date individuals in the tree care industry. As a group we have impact. The more numbers we have the more weight we will carry. We want to up-grade our profession as an industry and we can better do this as a group than we can individually.

There are many facets to todays' successful commercial arborist. It is our intent to provide as much input to each facet of that commercial arborist as we can!

WTT. What do you feel would be the single most important step that the industry could take at this time?

A. Sadly enough, as technically proficient as we are and as astute as we are becoming as businessmen, there is one ingredient that is lacking; a professional image. We are as unprofessional a group of pseudo professionals as one would find anywhere. In the last sixteen months I have traveled close to 50,000 miles visiting tree companies in all parts of the country from Maine to Florida and West to California. I have seen good tree work coupled with poor business practices and good business practices coupled with poor tree work. I have seen abominable customer relations and amateur equipment. If I was an OSHA compliance officer I would have writers cramp. Our professional image either doesn't exist or has been so maligned by unprofessional practices that it is beyond recognition.

With only a few exceptions, I have yet to see a commercial tree care company that has really put it all together. Considering the volume of information that management receives from trade association affiliations, trade publications and other sources it really is shocking to witness some of the things that I have seen.

It is imperative, if we have any hope of creating and maintaining a professional image, that we upgrade our standards and meet those standards with suitable management and production practices. Good practices mean more sales and more profit. Professionalism is a void in our image that must be filled.

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Greenbelt Buys Moody, Nees

Greenbelt Industries Inc. has announced the purchase of Moody Sprinkler Company and Nees Turf Supply. A group of private investors from within the irrigation industry comprise the nucleus of the Greenbelt venture.

Jim Head, spokesman for the Greenbelt group, has been named President of Moody Sprinkler Company, Inc. Other Moody officers will be A. C. "Ade" Klinkenberg, Vice President of Marketing, Rick Green, Vice President of Production and Leo Feuer, Secretary/Treasurer.

"The goal of this group is very simple," says Head. "We plan to use the well established Moody organization and its fine reputation for quality equipment as the foundation to build a strong, highly competitive irrigation manufacturer."

In addition to expanding the existing turf market, Moody plans rapid development of products in the lawn and garden, agriculture, hardware and international markets.

Head, former owner of South Orange Supply, a Southern California irrigation distributor, plans to direct Moody Sprinkler toward a program closely tied to its distributors.

"As president of the National Arborist Association, it is my privilege, with this bronze plaque to dedicate this live National Christmas Tree presented to the American people by the National Arborist Association." With these words NAA president, Thomas A. Morrison, Wilmette, Ill., (left) opened the ceremonies at which a commemorative plaque was installed at the National Christmas Tree in Washington, D.C. The occasion was appropriately Arbor Day 1975. Pictured at right is Bill Ruback of the National Capitol Park Service who will be responsible for the care of the tree.

Carbide's Sevin 4 Oil Insecticide Registered for Spruce Budworm

Sevin 4 Oil carbaryl insecticide has received federal registration for protection of spruce and fir foliage against spruce budworm. The material will be used operationally on one-half million acres of Maine forests this summer. Spraying began in early June and will take two to three weeks to complete.

Some 20,000 acres of budworm infested spruce-fir forests in Aroostook County, Maine were sprayed with the material in June of 1974 as a test. "Results showed good protection of foliage and that's what we were after," said Dr. John Dimond, professor of entomology, University of Maine.

Dimond explained that an important criteria of the test program was to determine the economics of various chemicals used. "Because pulpwood is a low value crop," Dimond said, "we were trying to determine the best material to use so that we don't apply any more chemical than the minimum amount necessary to keep those trees alive. We've demonstrated that Sevin 4 Oil works, and now we have to find the most economical application rates."

J. P. Cartier, Union Carbide field development representative for the Northeastern U.S., said Sevin 4 Oil will be used operationally at a rate of 1 pound per acre. Tests also will be conducted at lower rates.

Sevin 4 Oil is a unique liquid formulation of Sevin carbaryl insecticide in a low volatile, nonaromatic oil. This oil base formulation may be applied as an ultra-low volume or low volume aerial spray. The material is particularly well suited to large scale programs for control of forest and rangeland insects, due to its resistance to weathering and wash-off by rain. This results in longer residual activity on plant surfaces than Sevin wettable powder formulations. Another advantage is that the material needs to be applied only once per season for budworm control.

Dimond said the spruce budworm is a very mobile insect that now has established itself in most forest lands in Maine, Quebec and New Brunswick.

An estimated 185,000 cords of the spruce-fir timber in the Maine spray project area have already been lost to budworm attack. This infestation has been increasing steadily in eastern North America from five million acres in 1963 to an estimated 100 million acres now according to Dimond.

OSHA Training Institute Gets Improvement Award

Presidential Management Improvement Certificates for 1974 were awarded to the instructional staff of OSHA Training Institute in an award ceremony recently at the facility in Rosemont, Ill.

The award, the only one presented to an element of the U.S. Department of Labor for 1974, is based on criteria requiring "achievements having an outstanding impact on increased effectiveness in a vital function of government, including improved service to the public."

Citing accomplishments of the Institute faculty that made the award possible, Assistant Secretary of Labor John H. Stender, head of OSHA, who presided at the award ceremony, presented certificates to eight faculty members.

Stender conveyed to those pres-

ent at the ceremony the congratulations of James T. Lynn, Director, Office of Management and Budget, Executive Office of the President, who, in forwarding the certificates for presentation, had noted that "the significant achievements of these individuals in improving organizational effectiveness set an outstanding example for others in the Federal Government and reflect favorably upon (the Labor) Department."

EPA Sets Use Agreement For Noise Testing Lab

EPA announced recently that a use agreement has been negotiated with the National Aeronautics and Space Administration whereby EPA will use approximately 260 acres of land and buildings located within NASA's Plum Brook Research Center near Sandusky, Ohio, to conduct noise emission tests in connection with enforcement of new noise control regulations.

The 1972 Noise Control Act requires that EPA identify and set standards for new products that are major sources of noise pollution. In order to provide a national reference test site and to avoid relying completely on manufacturers' tests to determine compliance with the regulations, EPA determined that it would need a site of its own to conduct standardized tests for product noise emissions.

In choosing the Sandusky site, the Agency took into account such things as weather conditions, ambient noise levels at the site, and the proximity of the facility to places where products to be tested are manufactured.

To date, EPA has identified new medium and heavy duty trucks and new portable air compressors as major sources for which noise emission standards are feasible. As proposed, the EPA standards for these products will go into effect in late 1976.

EPA is currently considering noise regulations for tires, motorcycles, school buses, specialty and light trucks, lawnmowers, automobiles, snowmobiles, bulldozers, truck refrigeration units, garbage compactors, and other products. Limited simultaneous testing of different products is foreseen in the immediate future, but as more products come under regulation, EPA will expand the test facility.

EPA's noise regulations are expected to affect many small manufacturers who do not have noise testing facilities or the finances to construct them. Such manufacturers may wish to conduct their product verification tests at the Sandusky site.

Charles H. Cissel, vice president of Guardian Tree Experts and president of the Maryland Arborist Assoc., presents a plaque to Al Shigo, chief plant pathologist for the Northeastern Forest Experiment Station, Durham, N.H. The plaque reads "Dr. Alex L. Shigo, for dedication and superior service to the Maryland Arborist Association in the field of tree preservation, 1975."

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Landscaping, Horticulture In Need of Trained People

Arborists, florists, golf superintendents, landscape contractors, landscape designers, landscape maintenance firms, nursery businessmen and related horticultural enterprises are looking for young people with training in horticulture relating to production and landscaping.

With the current emphasis on ecology and maintaining or improving the environment, many firms specializing in these areas of horticulture are limited either in the scope of services they are able to provide or the quality of the service by the lack of personnel with adequate scientific horticultural training.

Thus, a number of horticultural associations cooperated in a national survey aimed at determining the expanding training opportunities available in these fields. The survey was planned as a follow-up to a similar one conducted in 1969. Participating in the current survey were the American Association of Nurserymen, American Sod Producers Association, Associated Landscape Contractors of America, National Arborist Association, National Landscape Association, Sprinkler Irrigation Association and the Professional Grounds Management Society.

Owners and managers of florist, nursery and landscape horticultural businesses, explained representatives of the cooperating associations, are becoming increasingly aware of the improved training programs at the technical level leading to certification or an associate degree. At the college and university level, some training institutions are emphasizing more applied work experience for those students planning to enter industry in contrast to a curriculum for someone planning a career in teaching or research.

In contrast to the earlier survey which only attempted to reach these training institutions offering a technical certificate or associate degree, this survey also attempted to reach those offering baccalaureate degrees in similar horticultural specialties. The survey was sent to 225 institutions in the U.S. and Canada. Of these, 202 responded.

The survey lists the name and address of the institution, the type of certificate or degree offered, the length of the training program, whether or not a work/study or co-op program is offered on an optional or mandatory basis, and whether or not instruction in sprinkler irrigation is included in the training program. In addition, the survey requested the number of students majoring in the specialty areas and in general environmental (ornamental) horticulture. The specialty areas included were nursery, landscape architecture, landscape contracting, landscape maintenance, general landscape, turf grass, arboriculture, and floriculture.

Copies of this survey, entitled National Survey of Post High School Vocational Horticulture Training, are available for $1 from the participating associations.

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Guide to Turfgrass Pests, New Publication from NPCA

A new technical guide on identification and control of lawn pests is now available from the National Pest Control Association.

NPCA's Guide to Turfgrass Pests is oriented towards the increasing number of commercial applicators in outdoor pest control. The 50-page manual provides descriptions and accompanying color photographs of every major insect and disease pest that attacks the American lawn. Descriptions detail:

- Scientific and common pest name
- Local or regional pest name
- Geographic locations where pests occur
- Host grasses
- Time of year when pest is active
- Conditions of lawns which favor pest development
- Description of pest and life cycle
- Symptoms of pest damage which aid in identification

A special lift-out page for continuing updates on chemical controls for pests described is also included.

The new guide costs $10 for NPCA members and $15 for nonmembers. Order the manual from National Pest Control Assn., Dept. OPS, Suite 1100, 8150 Leesburg Pike, Vienna, VA 22180.

Growing Bark Industry Plans Florida Meeting

The bark industry has burgeoned into big business during the past decade. Many mills which previously ignored the production possibilities for bark have been made aware that bark is a highly diversified product whose market is great and still expanding. Bark producers, those who are thinking of opening bark plants, nurserymen, grounds managers, landscape contractors and educators should plan now to attend the 1975 Annual Meeting of the National Bark Producers Association (NBPA).

This meeting, to be held October 2-5, in the Key Biscayne Hotel, Key Biscayne, Florida, will feature leaders of the bark industry discussing their specialties under three general outlines — merchandising and packaging, marketing of bark products and bark packaging techniques.

For further information, write: National Bark Producers Association, 1750 Old Meadow Road, McLean, Virginia 22101.

TOUGH ONES *(from page 18)*

arrives with a load, so a worker is directed to use a forklift to unload. To get what he needs he looks for a forklift. Under such an arrangement, who's responsible for getting best service from the forklift at best possible cost, or even keeping it running?

A careful preventive maintenance (PM) program for rough terrain forklifts can pay off with a surprising improvement in equipment reliability, a significant extension of useful and economical service life, a means of forecasting replacement, a reduction in service costs and a marked gain in productivity. Here's why.

Today's rough terrain forklift is designed as an all-purpose machine with use objectives keyed to creating a high productivity machine which is economical, serviceable, safe and easy to operate. Forklifts are now being designed with power trains, hydraulics systems and increased load stability which are unique to this equipment. These are designed as integral units and not as add-on attachments to existing tractors. This means they are, first of all, more expensive. Yet, because they are unit-designed for specific applications, they are also more suited to the required jobs. If maintained properly, these machines will surely give maximum return on investment, through reduced downtime and increased service life.

Start with Discipline

There's no magic formula to preventive maintenance programs. You simply must follow procedures outlined in the operator's manual at the intervals designated by the manufacturer. These recommendations are based on years of experience — both good and bad. Localized or special conditions may sometimes require a reduction of service intervals from factory recommendations, however, it is poor economy to extend service intervals beyond the manufacturers recommendations.

There are 11 major areas where forklift PM is often times neglected. Yet, all have specific means of contributing to lower operating costs.

1. **Engine lubrication neglect is disastrous.** Although today's oils are marvels of efficiency compared with those in the past, they are still affected by heat, cold, dust, fuel contamination and oxidation due to extended service intervals.

Recommended lubricant levels must be maintained and the lubricant changed at designated intervals. There's an old cliche that lubricating oils don't wear out, but very few people in the service business believe it. High temperatures cause oxidation, piston ring blow by causes fuel contamination, and dirt, which escapes the filters, adds to the lubricant contamination. All this means engine oil and the filter must be changed regularly.

In many situations, lubricant, fuel and air inlets also need protection from foreign material introduction due to vandalism. This last item is especially true around the big city job sites.

2. **Oil must be chosen with care.** Manufacturers of machinery specify both the API service grade of oil and SAE oil viscosities for various temperature ranges. Their recommendations are based on experience with the products. Depart from these recommendations and you have a cost stimulant. You can't choose lubricants by hunch. A low viscosity engine oil used during high ambient temperatures, or a viscous hydraulic fluid used during cold weather is a misapplication and can create major breakdowns.

3. **Electric starter motors, especially on diesel engines can be a source of high costs.** Many starters are ruined in this way: an operator will attempt to start a machine which is out of fuel. A machine, which has run out of diesel fuel, is refueled without having the entrained air bled out of its injection system. Of course, the engine won't start. Engine starters may draw in excess of 100 amps of battery current. The heat resulting from extended efforts to start can be extremely destructive to internal connections and wire insulation. This is why many operating manuals specify: "Do not crank an electric starter more than 30 seconds without allowing a two-minute cool down period."

Starting problems are often created by improper fuels. For example, a No. 2 diesel fuel in subzero temperatures can clog the injection pump and filters.

4. **Hydraulic systems can be harmed with costly results.** A. Probably the worst enemy of hydraulic systems is dirt in areas of close tolerance. In modern valves, clearances of 0.0005 inch between valve spool and valve body are not uncommon. While modern filters are capable of removing some contaminants of this particle size range, they can't remove them all. When hydraulic filters are not changed as recommended, the filters may load up. Then the filter bypass permits contaminants to go through the hydraulic system and the resulting action increases critical clearances.

A sticking valve spool is often an indication of severe oil contamination. A service mechanic can recognize this problem, because if he cleans or changes a valve without changing the contaminated oil, the valve spools will stick again.

In hydraulic pumps, contamination tends to increase the clearances, allowing oil to slip by the internal parts, thus creating heat.

B. Heat is probably the second

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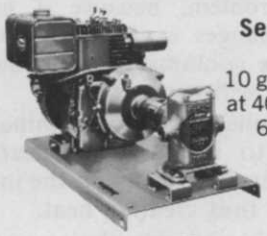

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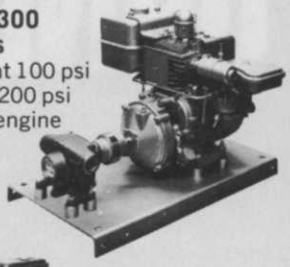

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most destructive thing in the hydraulic system because high temperatures tend to oxidize hydraulic oils, thus breaking down lubricity. Hot oil becomes thinner, thus increasing "slippage" through pumps which heats the oil even more, at high working pressures.

Hydraulic preventive maintenance, however, is simple, consisting of regular filter changes at specified intervals, the use of the proper hydraulic oil, keeping oil coolers and the outer surfaces of reservoirs clean. In all cases, oil must be stable throughout the recommended temperature range and have a high resistance to oxidation and foaming. Since hydraulic oils also deteriorate they should be replaced at recommended intervals.

C. Water or air in a modern hydraulic system is easily recognized as the oil will generally have a "milky" appearance. To determine whether the culprit is water or air, drop a couple of drops on a red hot metal surface; if it spatters then it's water, if it just smokes then it's air. Water may clog the filter, causing some unique problems which vary depending on the system. Most hydraulic filters have a low pressure bypass valve. When the filter becomes clogged, this valve opens and the oil goes around the filter, thus causing loss of filtration.

5. **Tampering with hydraulic relief valves can cause problems.** Hydraulic system relief valves have several functions. Primary of these is to limit the pressures in the circuit to a nondestructive level. Raising the relief valve pressures above the manufacturer's designated level may temporarily give increased lift capacity, but this often proves to be false economy in terms of increased maintenance and major breakdowns. A broken pump center ring is a sure indication of excessive operating pressures. This may be due to a readjusted or stuck relief valve, or it may be due to the wrong viscosity oil used in cold temperatures.

6. **Tires don't just run and run;** planned tire care helps conserve equipment costs and get better equipment use. Modern tires are excellent in terms of puncture-proofing and resistance to abrasion and cuts, but they can be damaged on cluttered worksites. The best preventive tire maintenance involves an operator who looks where he's going before he gets there. Replacement tires of lower ply rating are often times costly due to increased downtime from flats or failures.

7. **Electrical maintenance — a field of its own — starts with batteries.** Today's batteries have excellent service life if properly installed and serviced at regular intervals thereafter. A new dry charge battery should be slow charged until the specific gravity doesn't change over an hour period, after adding electrolyte. It is false economy to use a new dry charged battery without this procedure, because at installation the battery is probably not fully charged. It possibly never will be fully charged, considering that intermittent use of a forklift will not provide the additional charge needed.

Fast charging a new battery is risky, because resulting high temperatures can easily damage the cell structure.

Batteries need regular maintenance. The electrolyte level must be kept above the top of the cells to prevent sulfating of cells, which reduces the output capacity. Water, too, must be chosen with care. Many factory service people believe distilled water is still the best additive to put in a battery.

Excessive need to add water to batteries indicates overcharging, suggesting a voltage regulator problem. A charge voltage in excess of approximately 15 volts will cause water loss, however, this varies with ambient temperature. While you can't adjust many of the new solid state regulators, there may be a loose or corroded connection causing a voltage drop between the alternator or battery and the regulator.

An often neglected electrical maintenance item is keeping the alternator drive belt tensioned properly. If this belt is loose, the alternator may not be delivering enough output to a partially discharged battery to recharge it.

8. **General cleanliness pays off** by preventing hydraulic, fuel, or transmission contamination. By wiping off the filler cap and the filler neck before lubricants or fuel are added, you avoid adding external dirt.

Hydraulic reservoirs are also heat exchangers. An oil-coated reservoir attracts dirt, creating an insulated coating and so loses its

efficiency. If a forklift has a separate heat exchanger or oil cooler, they also must be kept clean, but not by means of a water hose. Steam cleaning or air-pressurized solvent will cut any oil film and clean away the dirt.

9. **Fuel choice and fuel storage are important** in forklift operation and maintenance. Even in view of current fuel costs, a few precautions can pay off in terms of decreased maintenance costs on your forklift. Keep your fuel storage tanks full, if at all possible. A full tank does not allow condensation — a cause of water contamination. Recognize that during fuel shortages, the available fuel may be less than premium quality, so use an inlet filter to prevent vehicle tank contamination. In addition, change fuel filters or drain the sediment bowl at more frequent intervals, particularly if you do get some low grade fuel. Because a given fuel supplier may be low on fuel, levels in storage tanks may be drawn down lower than usual. Therefore, any rust particles or any kind of contamination in the bottom of the tank, may be passed into the tank truck, bringing fuel out to the job site.

By changing engine fuel filters at more frequent intervals you save the heart of your diesel engine: the injection pump. It is worth the small additional expense to keep an adequate supply of fuel filters on hand especially in view of current service parts shortages.

10. **Engine radiators can't handle much exterior dirt.** If outside fins or tubes become coated with oil, dirt, or anything which reduces cooling efficiency, engine temperatures will go up, leading to reduction in power and possibly complete failure if not corrected. Steam clean the radiator, or blow off with pressurized air solvent if there is oil involved. Simple dirt can be cleaned with hot water on an air hose.

A rough terrain forklift needs its own brand of tender loving care. Some of this care includes frequent cleaning and lubricating of the mast chain.

11. **Forklift masts need their own brand of care.** Lack of lubrication will reduce service life on rollers and rails. However, mast rails used in an abrasive environment should be kept clean and dry to prevent accelerated heat due to grit entering the rail lubricant.

Don't Neglect The Operators

Operators need to recognize several major differences between a forklift and other equipment that they may have been operating.

1. They may have a 1500 lb load 30 ft in the air. At this time, the forklift must not be driven. Sudden movements under these kind of conditions could cause undue stress or strain on the mast structure.

2. With a mast at full extension, a forklift is an unstable structure. Therefore, an operator must have his load properly centered on the forks so there will be no load shifting.

The operator of a forklift can prevent major breakdowns in three ways: 1. He avoids the need for unnecessary maintenance through proper operation. 2. He is the eyes and ears for those who perform maintenance or repairs he cannot do himself. 3. He can also do a few simple things on the spot such as checking lubricant and coolant levels, tightening loose bolts or hydraulic connections, etc.

The skilled operator notices and reports unusual operating conditions, such as changes in engine sounds, a jerky motion of the mast, the forklift may not advance or back up as easily as previously. These problems are often times not recognized by maintenance personnel.

In summary, forklifts should not be neglected. They're not an expendable device, but an important tool and it costs money to buy and maintain them. How much forklifts cost to operate is variable. However, these costs can be minimized in the hands of thoughtful owners, operators and knowledgeable service personnel.

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Profitable Outlets For Wood Wastes

By DR. ROGER FUNK, Horticulturist, Davey Tree Expert Co., Kent, Ohio

BY FAILING to use wood residues, private industry is neglecting a valuable source of additional revenue.

The search for profitable outlets for sawdust, chips and similar wood wastes is often instigated by the need for reducing costs of disposal. Incinerators have been tried but the initial installation is expensive and incineration produces no useful product. Today, many municipalities and industries are utilizing chippers to reduce their waste wood to valuable chips which are selling for $15 to $40 per ton (depending on grade) throughout the United States.

Geographic separation of sources and markets and transportation problems arising from bulkiness severely limit profitable outlets for wood residues. Freight costs restrict the longest distance that low-grade material can be transported to about 100 to 200 miles. The feasibility of drying and compressing chips to economize on transportation and storage costs is being investigated. An automatic baling machine for wood wastes, recently developed in England, significantly decreases bulk and increases handling ease.

There is considerable variation between the chemical and physical properties of wood residues among species and tissues within a species. Thus, any high-grade utilization usually requires large amounts of clean, dry, relatively homogeneous material from a single species or from a limited number of species with similar characteristics. Frequently, however, the residue obtained is from a mixture of unrelated species and some undesirable "waste" remains even after processing. These factors indicate that initial commercial development should concentrate on the utilization of whole residues independent of its physical and chemical properties.

The primary uses for low-grade wood wastes can be grouped under three main categories: (1) fuel, (2) agricultural and (3) fiber.

Recent appraisals of the use of wood wastes as a fuel and of the equipment necessary for firing have appeared favorable. Improved multiple-fired burners have been developed, together with heavy duty presses that are capable of obtaining positive fuel values even from water-soaked material. Wood residues with up to 65% moisture can be burned. Kiln-dried wood residues produce about one-half the amount of heat from fuel oil or three-fourths of that from mineral coal.

Anerobic decomposition of wood wastes produces methanol, a high quality fuel that can be used in the basic areas of energy, such as transportation and heating. Wood wastes could be composted alone or in conjunction with other organic wastes such as garbage and sewage.

Methanol processing plants have been operational in Europe for a number of years but, although the economic and ecological value is well established, widespread interest has not developed in the United States.

Widespread interest, however, has developed in charcoal briquets and artificial logs in all parts of the United States as well as other nations.

Operational plants in Maryland, West Virginia, and Oregon utilize sawdust, woodchips and bark to produce compressed briquets for outdoor grills. Particle size or the species is not a primary concern since the material is shredded and mixed to produce a relatively uniform product.

Artificial logs for household fireplaces, barbecues and stoker fireplaces are produced by pressing and extruding fine wood particles with or without a wax binder. Either kiln-dried or green material can be used, depending upon the process.

The value of wood residue as a mulch, soil conditioner, and for animal bedding and roughage is well documented.

As a soil conditioner, wood and bark improve tilth, structure and

(continued on page 42)

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Maryland's Sod Industry Seeks State Assistance

Maryland's turf and sod industry, one of the state's newest and fastest growing agri-businesses, is actively seeking more technical and marketing assistance from state government.

At a joint meeting the industry-wide Maryland Turf Grass Council and the sod growers' organization, the Maryland Turf Grass Association, requested the support of various state officials, including Comptroller Louis R. Goldstein, Senator Howard J. Clark (D. Howard), Secretary of Agriculture young D. Hance and University of Maryland Vice President Frank Bentz.

The turf industry is requesting the addition of two specialists for the agronomy department of the University, which now has just one such specialist and no funds to employ more. Industry leaders pointed out that while Maryland produces more commercial sod than the states of Virginia, Pennsylvania and New Jersey combined, those states have the services of eleven turf agronomists.

Industry leaders also requested representation of the Maryland Agricultural Commission, the state agriculture agency's advisory body which is made up of commodity group members representative of the state's agricultural segments, and which has not yet had a member representing the commercial turf and sod industry.

Another request related to crop reporting, a function of the Maryland-Delaware Crop Reporting Service, which serves USDA and the Maryland Department of Agriculture. The turf people complain that their product ranks among the state's major crops, along with corn, wheat, soybeans and tobacco. Yet, it is not included in reports on production, dollar value, etc.

Addressing the industry meeting, Dr. John R. Hall, the University's only turf agronomist, estimated that there are now about 250,000 acres of turf being maintained in the form of lawns, golf courses, roadway strips and shoulders, parks, etc. and that it costs $80,000,000 per year all told to maintain.

The state's commercial sod growers now have about 13,000 acres of grass under cultivation. This "crop", according to Hall, has a potential market value, when installed at consumers sites, of an estimated $43,000,000. The state's largest producers of sod are Montgomery, Carroll, Harford and Howard Counties. However, sod is also produced in other counties, including Anne Arundel, Caroline, Queen Anne, Prince George, Washington and Allegany.

Hall estimates that it costs about $3,279 to purchase, transport and lay an acre of sod.

Sod is used in large quantities by golf course operators, apartment house owners, industrial plants, schools, hospitals and private institutions, as well as by homeowners. The recent housing construction slow-down has created a slump in sod sales. Industry leaders, however, believe that this is just a temporary situation. They are optimistic about the future, as homeowners discover that a sod lawn often proves far more satisfactory and sometimes more economical than preparing a new lawn from seed, or trying to revive an old, weed-infested yard.

Commenting on the meeting, Secretary Hance said that state officials are most sympathetic to the needs of the industry.

Edward Croft (above), an associate of the O. M. Scott & Sons Company for 50 years, was fatally injured in a farm accident June 3 near his home in Salem, Oregon. Croft started with Scotts in 1924 and over the past 50 years has worked in essentially all areas in the operation. Croft started Scott's first contract seed production program with growers in Washington in 1960, and gradually expanded contract seed production to areas of Oregon.

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SOD CUTTERS & HARVESTERS

The Brouwer Sod Harvester, its manufacturer says, will produce up to 1300 square yards of sod per hour with 2-3 people. The unit will roll, slab or fold sod and is built to cut in one of four widths: 15", 16", 18" or 24". Designed to mount on either a Ford or Massey Ferguson standard farm tractor, the Brouwer unit's most recent development is a 3-inch blade. The "throw away" side blades and bottom blade, the manufacturer says, are less expensive than conventional blades.

This is the Princeton 4020, a harvester which the manufacturer says can produce 1500 square yards per hour with a three-man crew. It is powered by a 172 cubic inch Ford industrial engine with Funk double-pump gear case. It has a Sundstrand pump and drive motor, Rockwell-Standard transmission/differential and Vickers accessory drive unit. It cuts 20" wide slabs, 40" long. (Another model, the 4816 is designed to produce 16" wide sod). Base price of the 4020 is $28,000 . . . options include a diesel engine, rear flasher lights and aux. elevator drive.

NEW! AQUAPROBE

Sub-Soil Moisture Tester

AQUAPROBE takes the guesswork out of soil moisture testing. Scientifically measures moisture at depths from 2 to 26 inches. No digging; no fixed point of measurement. Amazingly light-weight, portable and easy to use. Aquaprobe is low in cost, too. Write:

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seed, fertilizer, controls, etc.

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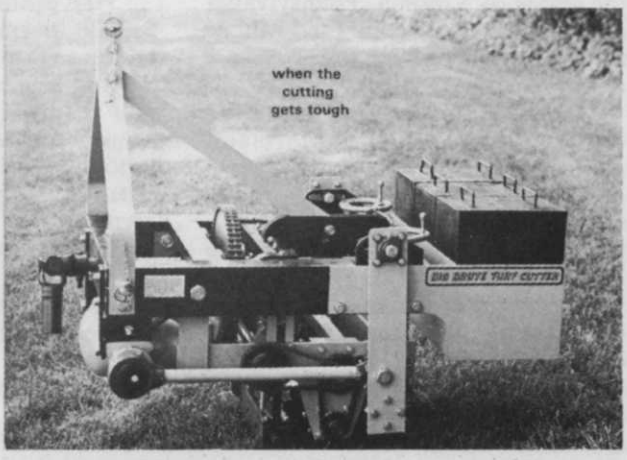

The Big Brute Turf Cutter (made by Finneyfrock's) is driven by a three-point hitch tractor and its P.T.O., at speeds of low, second, and third. The cutter, the manufacturer says, has yield of 33¼ square yards a minute in second gear, and 3 to 4 acres in an 8-hour day. Average blade life is 6 to 15 acres, the manufacturer says, and the side coulters will yield 25 to 35 acres. Models are available with cutting widths of 12", 15", 16" and 18" . . . all with or without Cut-off.

The Nunes Mechanical Sod Harvester features hydraulic controls which the manufacturer says allow for quick and easy adjustment to different field, terrain, soil and sod conditions while the unit is in operation. The unit, Nunes says, will cut, lift roll (or slab) and palletize more than 1000 square yards of sod per hour. The unit handles either rolls or slabs 12 to 20 inches wide (24-inch width machines on special order).

This is the Ryan Heavy Duty Sod Cutter, which through conversion can cut 12", 16" or 18" wide. The manufacturer says one man can cut 1¼ to 1½ acres of sod per day. The cut-off model offers automatic, vertical cut-off adjustable from 1 to 9 feet. There are two propulsion speeds on all models. The drive to the eccentric is now through heavy-duty spur gears. There's also an improved belt drive, the manufacturer says. A sulky roller attachment is available.

Three or four men can cut and roll 1200 yards of sod an hour with this machine, according to its manufacturer. It is the Beck Sod-o-Matic, a harvester which brings sod into large rolls, 3-16" strips 45 feet long, 180 square feet, 20 square yards. The big roll is started around either cardboard tubes or other type tubes and, when completed, can be moved and loaded by fork lift. At a job site, the big rolls are unloaded by and picked up by the tractor equipped with a laying device.

PRINCETON

EQUIPMENT FOR THE SOD INDUSTRY

(Ask the Man Who Owns One)

PRINCETON MFG. CO.

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Made for commercial use, by the world's oldest and largest manufacturer of portable high-concentrate mist blowers, SOLO's manually-operated sprayers are still attractively priced for the semi-pro and casual markets.

HANJET 455

The **HANJET-455** is our all-new 1975 addition to the low end of the SOLO line. An all-purpose sprayer for gardening, weed-killing, sanitation and many other outdoor and indoor applications. It weighs a mere 3 lbs and sprays its entire 1.3-US-gal. contents after just one pumping.

The famous **JETPAK-425** is surely your best buy for all casual-to-professional spraying jobs at any desired pressure from 0 to 90 psi. Ten pump strokes deliver one quart of liquid. Ideal for no-drift herbicide spraying at low pressure. Used extensively in the tropics for more than ten years — a product of mature design and extreme reliability.

SOLO supplies a wide line of sprayers, blowers, chain saws, tillers and other types of outdoor power equipment. We invite dealer and distributor inquiries on all of these products.

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Circle 141 on free information card

Superintendent Without Grass

By STAN METSKER, superintendent, The Country Club of Colorado, Colorado Springs

During the construction of a golf course, a golf course superintendent can make a vital contribution to its successful completion. Few superintendents go through this experience more than once or twice. It is a completely different set of responsibilities compared with the normal routine of maintaining a golf course with grass.

Ordinarily, the whole thing gets started when an owner of land makes a deal with a golf course architect. The architect may or may not also do the building. Many times there are other contractors brought into the project as sewers, water, electricity, telephones and houses are put in.

In all of the confusion of construction, many times there is only one man who will remain after all the building is done — the golf course superintendent. He is the man who must live with the results. Therefore, it makes a lot of sense to get the superintendent hired and on the job early in the construction period.

Usually, the golf course superintendent is the owner's representative on the job site. His responsibilities may include keeping track of which contractors are working each day and with how many men and what machinery. He may need to record when there is weather impairing the work. These records can be valuable if there is a time penalty in the contract. He should keep maps up to date, handle necessary invoices, and help to coordinate activities in the field with those in the owner's office.

To help control the quality of the course, the superintendent should be constantly aware of the drainage problems. He should personally have tests made of the materials used in the construction of the greens. Also, soil tests should be taken throughout the course so that fertilizer needs can be determined. According to the effect the golf course architect may want to achieve, the superintendent should help select grasses to do the job.

For example, architect Pete Dye, in an effort to emulate the Scottish effect on the Gates Course in Colorado Springs, did not want Kentucky bluegrass from fence to fence, even though the automatic water system covered the entire area.

The irrigation system and its pumping station are the heart of the golf course. The golf course superintendent should help decide which system will do the job best and then he should see that it is installed properly. He should personally take part in the staking of the heads. During the installation, he should have the authority to control the quality of the workmanship. His intimate knowledge of the system will serve the club in good stead during the difficult months the seedlings are being nursed into being the foundations of a golf course.

The golf course superintendent can save the owners of a new course time, money and many built-in headaches if he is on the job throughout the entire construction of the new golf course. He is not an architect or a contractor, but he knows what needs to be done to make the course maintainable. He is in a position to grease the wheels of progress which can avoid expensive delays. Above all, it is only he that can make the transition from raw ground to finished golf course complete.

Lawn King bags it!

NITROFORM*
organic nitrogen

The easy-handling, slow-release nitrogen that gives uniform coverage in any type spreader.

HERCULES INCORPORATED

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Meeting Dates

American Sod Producers Association, summer convention and demonstrations, Crown Center, Kansas City, Mo., July 17-18.

American Association of Nurserymen, centennial convention, The Palmer House, Chicago, Ill., July 19-23.

Horticulture Research Institute, New Horizons Day '75, The Palmer House, Chicago, Ill., July 23.

Penn Allied Nursery Trade Show, Hershey Motor Lodge and Convention Center, Hershey, Pa., July 29-31.

TVA Fertilizer Conference, Executive Inn, Louisville, Ky., July 29-31.

New York State Turfgrass Field Day, Warren's Turf Nursery, New Hampton, N.Y., July 30.

Turfgrass Field Day, The Ohio State University, turfgrass research plots, Columbus, Ohio, July 31.

Southern Nurserymen's Association, annual convention, Atlanta, Ga., Aug. 3-5.

Landscape Maintenance Symposium, Union Building, Michigan State University, E. Lansing, Mich., Aug. 4-5.

Rutgers 1975 Turfgrass Research Field Day, College Farm Road, New Brunswick, N.J., Aug. 5.

Illinois Landscape Contractors Association, Summer Field Day, Burr Oak Nursery, Round Lake, Ill., Aug. 6.

Garden Industry of America Market, Las Vegas Convention Hall, Las Vegas, Nev., Aug. 8-12.

Canadian Parks and Recreation Association, annual conference, Quebec City, Aug. 10-14.

International Shade Tree Conference, 51st annual meeting, Heritage Hotel, Detroit, Mich., Aug. 10-14.

Rhode Island Golf Course Superintendents, annual turfgrass field day, University of Rhode Island, Kingston, R.I., Aug. 20.

Illinois Turfgrass Foundation, Golf Day, Indian Lakes Country Club, Bloomingdale, Ill., Aug. 25.

Irrigation Seminar, sponsored by the Northern California Turfgrass Council, Asilomar Conference Grounds, Pacific Grove, Calif., Sept. 5-7.

Turf and Landscape Day, Ohio Agricultural Research and Development Center, Wooster, Ohio, Sept. 9.

Pacific Horticultural Trade Show, San Diego Convention Center, San Diego, Calif., Sept. 13-15.

Illinois Turfgrass Foundation, Inc., 1975 Field Day and Open House, University of Illinois, Urbana, Ill., Sept. 16.

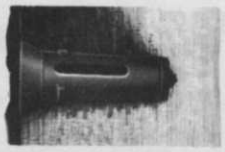
California Association of Nurserymen, annual convention, Town and Country Hotel, San Diego, Calif., Sept. 16-18.

Outdoor Pest Services Clinic, sponsored by the National Pest Control Association, Inc., Kansas City, Kan., Sept. 26-27.

IRON MEDICAPS CONTROL CHLOROSIS

of pin oaks & other trees

EASY TO USE TRUNK INJECTION GOES RIGHT TO THE PROBLEM



Iron Medicaps are the modern, effective way to treat for Iron Chlorosis in pin oaks. Two-year tests at Ohio State showed Iron Medicaps to be most effective . . . work at Illinois confirmed their findings. Treatment is easy with Iron Medicaps. You can do it yourself. It's a new injection system that puts iron directly into the sap stream. There's no loss to weather or leaching and it's perfectly safe. Treat an average tree in 10 minutes . . . see the results in 3 weeks or less. Spring or early summer treatment is recommended for best results.

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MODEL 88—88"
SUPER HEAVY DUTY
COARSE CUT
3 Point Hitch Mounted
Other models from 24" to 19 ft. gangs.

COST SAVING

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Air Pollution

What Role Do Trees Play in Cleansing the Air?

By BRUCE R. ROBERTS and ALDEN M. TOWNSEND, Agricultural Research Service, U.S.D.A., Delaware, Ohio

Table 1. Foliar uptake of sulfur dioxide by woody plant species fumigated at 1.0 ppm for 1 hour.*

	SO_2 uptake (mg)	
Species	Per unit area	Per unit weight
Red Maple	0.088[a]	0.260[a]
White birch	0.086[a]	0.268[a]
Sweetgum	0.074[ab]	0.267[a]
Firethorn	0.072[ab]	0.213[ab]
Privet	0.068[ab]	0.134[bc]
Rhododendron	0.056[ab]	0.079[c]
White ash	0.046[b]	0.118[c]
Azalea	0.044[b]	0.072[c]

***Values followed by different letters in the same column are significantly different at the 5% level.**

ONE DETRIMENTAL side-effect of the increasing energy demand in this country is the possibility of higher levels of air pollution. With more and more industries converting to coal as an alternative source of energy, the concentration of certain atmospheric pollutants, particularly sulfur dioxide (SO_2), will increase proportionately. Thus, despite our efforts now and in the future, a certain degree of air pollution is inevitable. The problem then becomes one of maintaining pollution at some acceptable level. This can be accomplished in two ways: (1) by controlling the source of pollution through proper legislation and surveillance; and (2) by maintaining an adequate and effective reservoir for existing pollutants. Much has been said and written about the former approach; let us look briefly at the latter possibility.

There are three naturally-occurring reservoirs for atmospheric contaminants: soil, water, and vegetation. Only in the past few years have scientists considered the potential ability of plants to influence air pollution levels. Recent

Recent research at the USDA's Shade Tree and Ornamental Laboratory has been directed at helping to understand the role of wood plants in influencing air quality.

right-of-way to clear??

WITH BIG HILLS ON IT? NOW THAT WE'VE ADDED CATERPILLAR® POWER, WE'VE GOT YOUR MACHINE . . . .

Our new Klearway 10-7 has a Cat® 3208 engine providing over 50% more power than previous models.

That means big hills and fast cutting for the Klearway . . . . .

And that means time and money saved for you.

KLEARWAY - the most advanced cutter made.

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research at the U.S. Department of Agriculture's Shade Tree and Ornamental Plants Laboratory has been directed at helping to understand the role of woody plants in influencing air quality.

Container-grown seedlings of white birch, red maple, white ash, sweetgum, rosebay rhododendron, kurume azalea, privet and firethorn were fumigated with SO_2 for one hour at a concentration of 1.0 ppm (Table 1). Fumigations were performed in a specially designed chamber under carefuly controlled environmental conditions. The results of this research indicate that maple, birch and sweetgum are capable of removing greater quantities of SO_2 from the air than are rhododendron, ash, and azalea. Privet and firethorn show an intermediate response.

Another investigation with the same group of plants shows that there is variation in SO_2 uptake at different pollutant concentrations. For example, white ash does not respond differently to SO_2 levels of 1.0, 0.5, and 0.2 ppm, whereas white birch takes up significantly less SO_2 at 0.2 ppm compared with uptake at higher concentrations. This variation probabaly reflects differences in stomatal response to SO_2, and is a problem which needs additional research. Significant variation was also demonstrated in the amount of ozone (O_3) absorbed by leaves of white oak, white birch, coliseum maple, sugar maple, redvein maple, red maple, Ohio buckeye, sweetgum and white ash (Table 2). Seedlings of each species were fumigated at 0.2 ppm in a plastic chamber contained inside a controlled environment room. In these experiments it was found that oak and birch remove the largest quantities of O_3 and red maple and ash, the least. The remaining species show an intermediate response.

Differences in O_3 uptake were also found to be significant among red maple seedlings from Pennsylvania, Minnesota, Maine, and Alabama. Seedlings from the Pennsylvania source demonstrated higher rates of O_3 uptake than red maple seedlings from the other locations. This information illustrates that it may be possible to select certain plants within a species which exhibit exceptional potential in removing gaseous pollutants from the air.

Although all of our research to date suggests that woody plants do, indeed, absorb contaminants from the air, the practical significance of this phenomenon is not yet clear. Despite predictions to the contrary, it seems unlikely that vegetation can significantly reduce high gaseous pollutant levels for long periods of time. However, it does seem probable that certain trees can have an influence on air quality if pollution levels are not too high. Thus, the strategic location of greenbelt plantings containing especially effective "sink" species may be an effective way to achieve acceptable air quality levels in localized areas.

Table 2. Rates of ozone uptake by various shade tree species from an atmosphere containing 0.2 ppm O_3.*

	O_3 uptake (mg)	
Species	Per unit area	Per unit weight
White ash	0.635^{a}	1.318^{b}
White birch	0.536^{ab}	2.347^{a}
Colesium maple	0.502^{b}	0.991^{c}
Sugar maple	0.371^{c}	0.863^{c}
Ohio buckeye	0.362^{c}	0.927^{c}
Redvein maple	0.285^{cd}	0.911^{c}
Sweetgum	0.278^{cd}	0.854^{c}
Red maple	0.272^{cd}	0.555^{d}
White ash	0.239^{cd}	0.555^{d}

***Values followed by different letters in the same column are significantly different at the 5% level.**

Ride out summer drought.

Wilt Pruf now!

During hot, dry spells, WILT PRUF NCF* conserves precious moisture in shrubs, trees, roses, and turf. In summer, just as in winter, WILT PRUF NCF Anti-Desiccant *adjusts* plant transpiration, the natural process of water loss, to the season's needs. You can transplant safely in summer by applying WILT PRUF NCF, preferably before you dig. Over 20 years of outstanding success in top nurseries in every state. Approved for use on all growing edible products.

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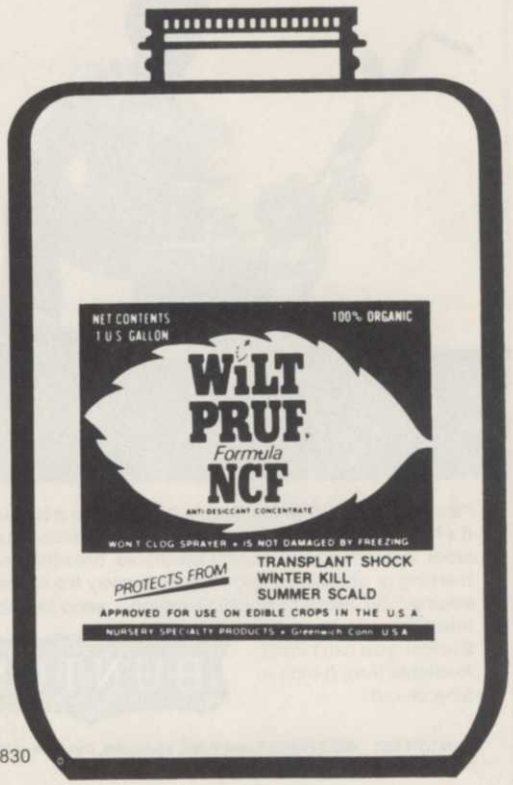

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Circle 116 on free information card

People on the Move

William D. Hughes, Tom Chapman and **John King** have been appointed district sales managers for Toro's consumer product lines. In other company moves, **James Lovaas** has taken charge as general manager of the Toro assembly plant in Tomah, Wis.

* * *

Allis-Chalmers Corp. named **Daniel H. Nelson** advertising manager for Agricultural Equipment Divisions.

* * *

E. James Nilmeirer has been promoted to an agricultural chemicals district sales manager for the Elanco Products Co. He will manage the Lubbock sales district and reside in the Dallas, Texas area. **Oran H. Nunley, Jr.** and **Harry L. Peck** were also promoted within the organization to the positions of sales representatives.

* * *

Pennwalt Corporation's Agchem Division named **Cecil Reeder** to represent Agchem in the states of Illinois, Missouri, Kansas and eastern Iowa. At the Division's Technical Research Center in Tacoma, Washington new Field Technical Supervisors include: **Dr. Jeffery Huether** in the Northeast region; **Bruce MacCoy** in the North Central region; **John Rinehold** in the Northwestern region.

* * *

Badger Dynamics, Inc. named **Thomas D. Lyons** to its board of directors. Lyons is vice president of Carney-Rutter-Roberts Co., a Milwaukee based insurance company.

* * *

Jerome K. Green, J I Case senior vice president - Finance and Corporate Planning, has been promoted to the position of senior vice president and general manager of the company's International Division.

* * *

Michael H. Blake, elected president of Lowden, Inc., tree care specialists located in Needham Heights, Mass.

* * *

Peter McGonagle, appointed regional sales manager for Western Plastics Corp.

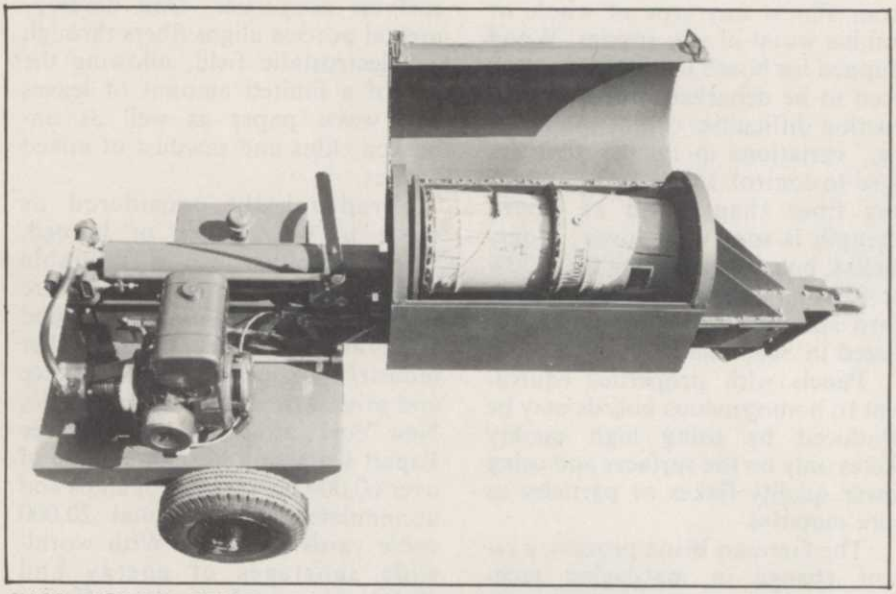
* * *

A. Cleve McCarty, named chief operating officer of all of Beker Industries operations. **Jim R. Clare,** elected vice president, finance, and executive assistant to the chairman of the board. **Joseph C. Minio,** elected vice president and treasurer.

* * *

Hugh Lautner, appointed manager, research and development, Carburetor Div., Walbro Corp. **John W. Underwood,** appointed managing director of the company's subsidiary in Hamburg, West Germany.

Industry Product Review



CAN COMPACTOR: Piqua Engineering introduces a 12-ton hydraulic pressure unit capable of compacting two 5 gallon cans to 10 percent normal size in 20 seconds. Compacting area is fully enclosed. Drip pans catch any remaining fluid left in cans. Powered by an 8 H.P. Kohler industrial engine or with a 5 H.P., 3 phase, 60 cycle, 220/440 volt AC motor.

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METRO-LIFT: A personnel lift when mounted on the 3-point hitch of a tractor and connected to the hydraulic system is capable of raising 600 pounds to a height of 20 feet. It can be operated by a remote valve on the personnel basket or from the tractor cylinder valve. Removing the basket and lift arm converts it to an adjustable crane with the lift capacity of 6,000 pounds when closed and 2,000 pounds when fully extended. This unit is manufactured by Metro hydraulics.

Circle 702 on free information card.

SHIGOMETER: Ben Meadows' battery-operated instrument pinpoints discoloration and decay in their early stages before they are evident externally. The manufacturer claims the meter is an extremely sensitive instrument that accurately measures any amount of ionization to provide detection of both incipient and advanced decay and discoloration. Shigometer indicates the degree of tissue deterioration and the extent of tissue damage. Ideal for utility pole, park and recreation area management, forestry research and inspection. It weighs only 3 lbs., 6 oz. and is carried by a neck strap.

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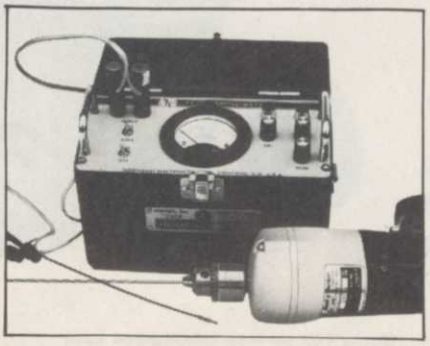

TREE PRUNING KIT: The "Safe Stick" fiberglass pruner poles are designed for professional type use, for line clearance and maintenance of trees. Manufactured by the Jameson Corporation, the poles come in various lengths and combinations for use with this kit.

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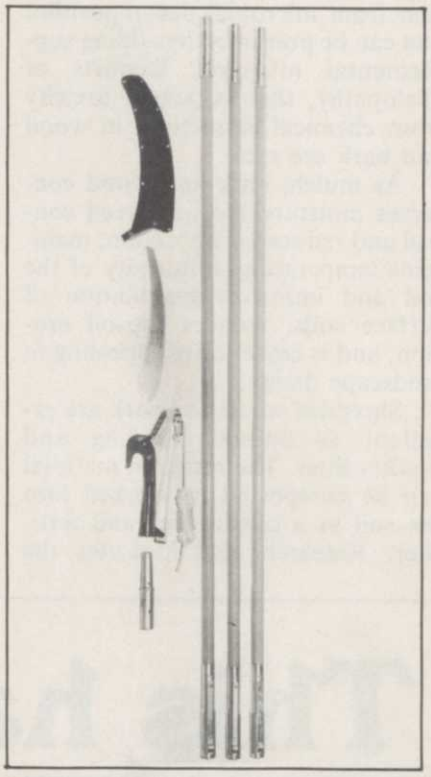

Lawn-A-Mat bags it!

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The odorless organic nitrogen. Has predictable performance, too. Try it.

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Circle 115 on free information card

WOOD WASTES *(from page 32)*

aeration and increase water absorption and nutrient retention. Early literature on the subject reported toxic effects from wood residues in the soil. However, the yellowing associated with incorporating fresh wood is the result of nitrogen depletion from microbial decomposition and can be prevented by adding supplemental nitrogen. Reports of allelopathy, that is, actual toxicity from chemical extractives in wood and bark are rare.

As mulch, bark and wood conserves moisture through weed control and reduced evaporation, maintains temperature uniformity of the soil and improves granulation of surface soils, reduces topsoil erosion, and is esthetically appealing in landscape design.

Shredded wood and bark are excellent as animal bedding and poultry litter. The resultant material can be composted or worked into the soil as a conditioner and fertilizer. Research also indicates the value of shredded wood and sawdust as roughage in the diet of feedlot cattle fed high-energy grain.

Structural board can be made from almost any type of whole or residue wood of any species. Wood chipped for board materials may not need to be debarked if certain production difficulties can be tolerated, e.g., variations in quality that are hard to control. In general, bark has less fiber than wood so board strength is somewhat lower. Nonetheless, boards containing up to 30% or 40% bark and still meeting standard specifications have been produced in Scandinavia.

Panels with properties equivalent to homogeneous boards may be produced by using high quality flakes only on the surfaces and using lower quality flakes or particles as core material.

The German Bison process, a recent change in mat-laying technology produces a graded density board with longer, stronger splinter-like shavings at the core and fines at the surface.

Structural boards can be made with large flakes, strands or fibers. Orientation of all or part of the particles can impart high binding and stiffness properties. One developmental process aligns fibers through an electrostatic field, allowing the use of a limited amount of leaves and waste paper as well as unbarked chips and sawdust of mixed species.

Traditionally considered as waste to be dumped or burned, wood residues are a valuable resource. Thousands of tons are available throughout the United States as a by-product of the lumber industry, public utility line clearance and private tree services. In Buffalo, New York, alone, The Davey Tree Expert Company has a stockpile of over 60,000 cubic yards of chips and accumulates an additional 20,000 cubic yards annually. With worldwide shortages of energy and materials, wood wastes offer a myriad of revenue sources that should not be allowed to go up in smoke. □

This harvester works anywhere

Unlike other harvesters, the Nunes Mechanical Sod Harvester is guaranteed to work wherever cultivated sod is grown.

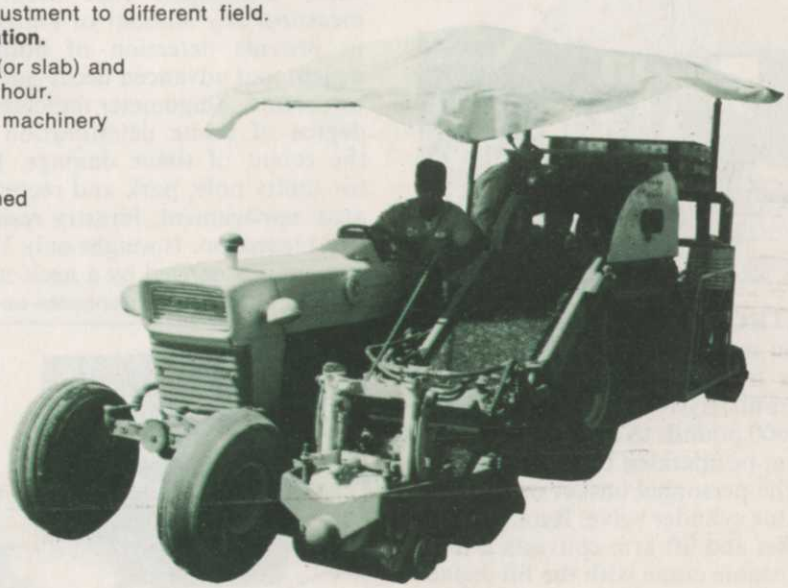
Hydraulic controls permit quick and easy adjustment to different field. terrain, soil and sod conditions **while in operation.**

With the Nunes Harvester, you can cut, lift, roll (or slab) and palletize more than 1000 sq. yards of sod per hour.

Roll or slab units are interchangeable and the machinery handles rolls or slabs 12 to 20 inches wide (24-inch width machines on special order.)

Also available are turf vacuum sweepers designed especially for sod; 8 feet wide, 13 cu. yd. capacity.

Writed for detailed brochures and additional information.



Nunes Manufacturing Company
2006 Loquot Ave., Patterson, Calif. 95363
Phone (209) 892-8773

NUNES SOD HARVESTER

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For ad on following page Circle 138 on free information card

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The concentrated solution to grassy weed problems.

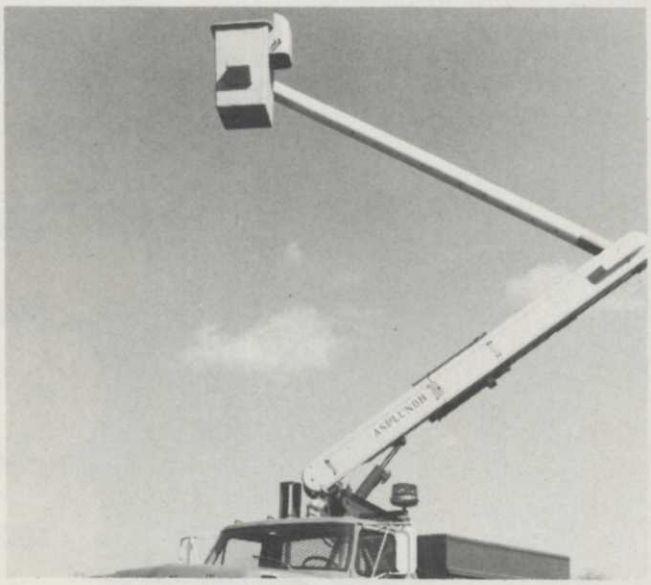
Daconate 6 has proven to be a popular and effective herbicide on golf courses, parks and other grass areas. It gives you concentrated power to knock out tough, grassy weeds after they are up and growing. It does away with problems such as bahiagrass, barnyardgrass, chickweed, crabgrass, dallisgrass, nutsedge, sandbur and wood sorrel . . . *with little or no injury* to established, actively growing turf. Daconate 6 comes in convenient liquid form . . . dissolves easily in water in the spray tank. And Daconate 6 is concentrated. Contains 6 lbs. per gallon of active ingredient. It's also premixed with the proper amount of surfactant for optimum coverage and control.

Go Daconate this year . . . the concentrated approach to better turf.

Diamond Shamrock

AGRICULTURAL CHEMICALS DIVISION

Industry Product Review



ELECTRIC LINE LIFT: High capacity 12 volt batteries power this Asplundh lift. The batteries are recharged by either the truck's 12 volt alternator or an AC charger in the truck body. Controls in the basket automatically activate the system and give the operator complete command of all movements. This electric system reduces fuel consumption and engine maintenance while eliminating noxious exhaust fumes. Operation is quiet, permitting normal conversation between bucket operator and ground personnel.

Circle 705 on free information card.

WHISPER CHIPPER: Over the past 25 years Asplundh has improved and redesigned their basic chipper, based on the direct reports of actual operators within their organization. Asplundh features four chipper models ranging from a 12-inch, 4 cylinder standard chipper to a heavy duty 16-inch, V-8 engine. The company claims the model 12-inch, 4 cylinder JEY has a reading of approximately 73 to 77 decibels at 50 feet. Other models vary, and noise level while chipping depends on material being chipped.

Circle 706 on free information card.

Kerr-McGee bags it!

NITROFORM*
organic nitrogen

HERCULES INCORPORATED

The economical nitrogen that feeds for months because it has different release rates . . . like time-release cold capsules.

Turf and Horticultural Products, Synthetics Dept.
Wilmington, Delaware 19899

* Registered trademark of Hercules Incorporated. STH74-24AR

Circle 114 on free information card

AERIAL TOWER: The B-Series of Baker Equipment Engineering Co. aerial towers features a fiberglass upper boom with 16 feet of bare fiberglass between the elbow and operators platform, providing high dielectric properties. The unit is available in a variety of options and basket mounting configurations.

Circle 707 on free information card.

CORDLESS DRILL: New cordless drill from Skil permits work anywhere, with no dependence on electrical source. The drill has a geared chuck, with built-in storage for the chuck key. The tool handles the full range of ⅜-inch drill accessories. It comes equipped with a recharger which works on normal 115volt AC current. The drill weighs 2.2 pounds.

Circle 708 on the free information card.

ROTERRA: The Lely-Roterra has an egg beater like action created by a row of rotor-tines. Rotors next to each other revolve in opposite directions. And each set of tines is always at right angles to those next to it. The circumscribed pattern they make overlaps slightly so that all soil gets worked. Variable tine speed can be adjusted to soil conditions. Tough cloddy soils require faster tine speeds. Manufacturer claims the Roterra does not reverse the soil. Top soil stays on top while moisture is kept below.

Circle 709 on free information card.

SKID STEER PAY LOADER: New from International Harvester is this 37 HP model. Unit is highly maneuverable with lift capacity of 1,950 pounds; has two-lever skid steering that permits 360 degree turns; hydrostatic drive with infinitely variable forward and reverse speeds from 0 to 8 mph; four-wheel drive; oscillating axles for better traction; changeable tread widths with reversible wheels; fast cycling loader; roll-over protective structure; and a variety of quick-change attachments.

Circle 710 on free information card.

HERCULIFT: All-weather, all-terrain lift truck from TCI Power Products, Inc. Power steering is standard, equipped with separate pump, orbital control and cylinders. Pump, live drive vane type, delivers 14 gpm at 2400 rpm; control valve is spool type, full feathering. Four-wheel service brakes have hydraulic internal expanding double shoe with bonded lining.

Circle 711 on free information card.

PRO ULV SPRAYER: Root-Lowell designed this electric motor unit for application of synergized pyrethrins concentrates and related formulations. The sprayer is said to produce a discharge in the aerosol particle size range with average particle size in controlled testing at 8.5 microns. Further product features include high speed airblast and long discharge carry; up to 100 feet in still air.

Circle 712 on free information card.

Pacific Agro bags it!

NITROFORM*
organic nitrogen

The turf nitrogen for nursery stock, too.
Gives the same steady sustained growth.

STH74-18AR

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INCORPORATED

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Wilmington, Delaware 19899

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Circle 111 on free information card

A burst of brilliance...
Fylking for the World's Fair!

Fylking Kentucky bluegrass is a superior, elite bluegrass that burst like a star on the scene in the sixties!

Since then Fylking has established records making it the perfect choice for the official grass at the environmental World's Fair, Expo '74.

Fylking has proven to have superior resistance to disease and drought; withstands traffic. Its thickly woven rhizome root system develops dense sod so quickly Fylking can be lifted in 90 days. Fylking can be mowed at 3/4 inch (even 1/2 inch) and thrive. It absorbs carbon dioxide pollutants, gives off oxygen, cools air by releasing water vapor.

A superior mixer, Fylking greens up earlier in spring, stays greener in summer heat, remains green longer into fall.

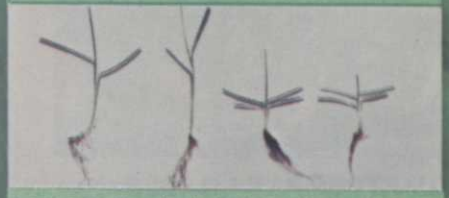
Choose Fylking and your customers are getting a grass good enough for a World's Fair!

FYLKING KENTUCKY BLUEGRASS

U. S. Plant Patent 2887

Another fine product of Jacklin Seed Company

Fylking's rhizome root system develops so thickly, under ideal conditions sod can be lifted in 90 DAYS.



Low growth, short leaf sheaths and abundant tillering of Fylking (right) compared with another elite bluegrass plant.

Cross section displays thick, luxuriant turf, fine leaf texture and brilliant green color of Fylking.

Circle 121 on free information card

PTO REEL MOWER: Brouwer Turf Equipment Limited, designer and builder of the Brouwer Sod Harvester, have added a new piece of equipment to their product line. This PTO reel type mower is light in weight. The free floating unit follows the ground contour for uniform cutting. The five mower units cut a width of 140 inches and pulled by a 25 HP tractor, will cut 5 acres per hour at normal speeds. The unit can be towed behind a car or truck since all mower units lift and lock up into position.

Circle 713 on the free information card.

SPRAYER: Broyhill's basic unit is a skid mounted sprayer in 200, 300 and 400 gallon sizes for all size coverage requirements. Polyethylene and stainless steel tank materials overcome the problems of rust and corrosion while full circumference heavy gauge skids provide four side protection with maximum stability. Three standard pump options include four piston 10 gpm Seeger-Wanner; four piston gpm Hypro and a high volume Ace dual stage centrifical.

Circle 715 on the free information card.

HYDRO MULCH FIBERS: Designed by Conwed to improve the hydraulic mulching process in areas of severe wind or water erosion. A soil stabilizer has been premixed with Hydro Mulch fibers; a uniform, weed-free fiber that helps foster good germination by retaining water and protecting seed from temperature extremes.

Circle 714 on free information card.

SPLITTERS

MS-400

MINI-SPLITTER—8 H.P. Air Cooled Engine, Heavy Duty Ram Cylinder, Splitting Cycle—12 Seconds, Rugged Tubular Steel Frame, 7 Gallon Hydraulic Oil Reservoir, Splitting Length—up to 20".

LS-500

LITTLE SPLITTER—16 H.P. Air Cooled Engine with Electric Start, 2-speed Hydraulic System, 5" Dia. Ram Cylinder, Splitting Cycle—9 Second, Splitting Length up to 24", Ram Exerts 15 tons of Hydraulic Push, 15 Gallon Oil Reservoir.

SM-500

SAW-MATIC—25 H.P. Air Cooled 2 Cylinder Onan Engine with Electric Start, 10 Gallon Gas Reservoir, Splits Into Halves or Quarters, Heavy Duty Hydraulic Cylinders designed by Hy-Draulic Products, Ram Exerts 15 Tons of Hydraulic Push, Rugged Square Tubular Frame.

HY-DRAULIC PRODUCTS

1319 Town Street, Prentice, Wisconsin 54556
Telephone: 715-428-2881

Circle 140 on free information card

Classifieds

When answering ads where box number only is given, please address as follows: Box number, c/o Weeds Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

Rates: All classifications 50¢ per word. Box number, $1. All classified ads must be received by Publisher the 10th of the month preceding publication date and be accompanied by cash or money order covering full payment.

FOR SALE

ARPS stump cutter teeth, top quality and best price in U.S.A., D. J. Andrews, Inc., 17 Silver St., Rochester, New York 14611. Call 716 235-1230.

IRRIGATION SALES & SERVICE COMPANY, $400,000. Largest on Florida gulf coast. Owner might consider full time working partner. Reply P.O. Box 2061, Clearwater, Florida 33517.

USED EQUIPMENT

1972 FLECO 26" tree shear, $4500.00. Jim Green, Ohio Chipper & Equipment Company, Div. of Osborne Brothers Tree Service, Mentor, Ohio 216 951-4355.

FOR SALE: Used Ryan 18" auto-cutoff sod cutter with sulky. May be seen at Oak Harbor, Ohio. Phone 419 893-2311 or 308 697-4686.

FOR SALE — 1 Ryan sod cutter and sulky roller model 544682, serial 33915, cost $2300.00 new, 1973 model used only 9 months, will sell for $800.00 or best offer. Sac Valley Sod Farm, R1, box 56, Morrisville, Mo. 65710. Phone 417 756-2970.

FOR SALE: 2 used aerial baskets — 50 ft. working height, 2 Asplundh brush chippers. Bean sprayer, 35 G.P.M. Vermeer stump cutter 1560. Parkway Tree Service, Milwaukee, Wisconsin. Phone 414 257-1555.

HYDROSEEDER, Hydroturf 600 gallon, one year old, excellent condition. Cost new $4000, sacrifice at $3000. Lawn Medic, 212 Cobblestone, East Peoria, Ill. 61611. Phone 309 699-0780.

FOR SALE: 1973 model beam 60 GPM sprayer, trailer mounted on 20 x 20 flotation tires, less than 40 hours use. $5500. Route 1, Box 68, Union Star, Missouri 64494.

1973 SKYWORKER, Big Chipbox, Wisconsin pony engine. 1973 F600 Ford, long wheel base, 2-speed axle, hydraulic pruner included. $15,000.00 firm. Call 914 895-3495.

2 — 24-INCH RYAN SOD Cutters, 1 — Daymon sod roller, 1 sod conveyor. Del Gaudio Sod Farm, Phone Howell, Michigan 517 546-3569.

HYDRO-AX FOR SALE, excellent condition, $35,000.00. Call Robert Hooper, Monroe Tree & Landscape, Inc., Rochester, N.Y. 716 436-2900.

VERMEER TS-30A tree spade, Bowie Victor 500 hydro-mulcher. Phone 817 469-8943.

SEEDS

SOD QUALITY Seeds Merion, Fylking, Delta, Park, Newport, Nugget, Adelphi, Cheri, Glade and Baron bluegrasses also fine fescues. Manhattan rye grass. Custom mixing available. Michigan State Seed Co., Grand Ledge, Michigan 48837. Phone 517 627-2164.

HELP WANTED

DISTRIBUTORS for D. J. Andrews, Inc. stump cutter teeth, pockets and bolts. Best wholesale and retail price in U.S.A. Add to this exclusive area, local advertising at our expense, etc., and you have our story. D. J. Andrews, Inc., 17 Silver St., Rochester, N.Y. 14611. Call 716 235-1230, or 716 436-1515.

WANTED MANUFACTURERS' REPRESENTATIVE Long established manufacturer of quality irrigation controls desires representation in Southern California area, including Arizona and Clark County, Nevada. Sales thru established distributors and O.E.M. accounts. Warehouse desirable to handle Consigned Stock. Write Mike Bizzoco, Tork Time Controls, 1 Grove St., Mt. Vernon, New York 10550.

AGGRESSIVE DISTRIBUTOR looking for qualified turf grass man to call on golf courses and other institutional accounts selling fertilizers, chemicals, etc. Please send resume to H. J. Stoll & Sons, Inc. 2320 S.E. Grand Ave., Portland, Oregon 97214.

MISCELLANEOUS

EQUIPMENT SERVICE AND PARTS — New England and New York State. Authorized servicing of aerial lifts and chippers by factory trained personnel. Specializing in Asplundh and Skyworker. Two convenient locations plus complete road service. Service contracts available. Call C.U.E.S., Inc., 603 889-4071 or 203 634-3146.

Reed & Perrine bags it!

NITROFORM*
organic nitrogen

The odorless, dust-free, pathogen-free organic nitrogen. Applying Nitroform doesn't interfere with normal use of turf areas.

STH74-19AR

HERCULES INCORPORATED

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Advertisers

Adelphi Kentucky Bluegrass..19
Brouwer Turf Equipment Ltd.27
Bunton Company 40
E. F. Burlingham & Sons 13
Howard Crane, Inc. 34
Creative Sales, Inc. 37
Diamond Shamrock Chemical Co.....2nd cover, 43
Ditch Witch Trenchers 23
Dow Chemical Co. 10, 50
Hercules, Inc. 25, 28, 33, 36, 41, 44, 45, 48
Hy-Draulic Products 47
Hypro, Inc. 30
Jacklin Seed Co. 6, 46
Jacobsen Mfg. Co..... 3rd cover
Jobe's Tree Food Spikes..... 3
Johns-Manville.....15
Kershaw Mfg., Inc.....38
Laval Separator Co.....29
Lawn Maker, Inc. 34
Lofts Pedigreed Seed Co..... 4th cover
Magline, Inc. 11
Ben Meadows Co. 17
Mott Corp. 37
Nunes Manufacturing.....42
Nursery Specialty Products....39
Pickseed West.....40
Princeton Mfg. Co.....35
RainBird Sprinkler Mfg. Co.. 8
Safety Test & Equipment Co. 24
Sea Ranch 32
Skil Corp. 9
Solo 36
Stanley Hydraulic Tools 31
Stihl American, Inc. 5
Tuco Div., Upjohn Co. 7, 22

SCHOOLS & COLLEGES

HOME STUDY PROGRAM IN ARBORICULTURE. A series of 16 lessons in the care of trees. Developed by professional commercial arborists as a means of upgrading the knowledge of their employees. This program is available to all students of the tree care profession. For further information contact The National Arborist Association, 3537 Stratford Road, Wantagh, New York 11793.

WANTED TO BUY

WANTED: Company in landscaping, utility right of way maintenance, or tree trimming business. Would also consider purchase of part interest. Box 133, Weeds, Trees and Turf, 9800 Detroit Avenue, Cleveland, Ohio 44102.

WTT's August Equipment Rally Features mowers, tractors, engines, batteries, implements & accessories

Trimmings

New copies of American Sod Producers Guidelines Specifications to Sodding have been printed and are available in quantity from the ASPA office in Hasting, Neb. Single copies are available on request, with additional copies available for 25¢ each plus mailing. These specifications should be provided to landscape contractors, architects, and others interested in providing quality sod at an ASPA standard. For more information contact: ASPA, Association Building, 9th and Minnesota, Hastings, Nebraska 68901.

"Hang in There" was the theme of the First International Hang Gliding Championships, held at Escape Country, California. Located in Orange County near El Toro, Escape Country was host to hang glider pilots from all over the U.S. and eight foreign countries. More than 4,500 spectators viewed the event live while millions watched the championships on CBS — TV's Sports Spectacular. Cal-Turf, Camarillo-based turfgrass grower, furnished the landing area and target for the glider pilots, which consisted of 10,000 square feet of Tifway Sod.

Live Oak, Texas residents claimed rats and snakes infested weed-choked creek banks and demanded city officials take immediate action. Mayor John Harper gathered city crews together and armed with 2,4-D attacked the infested embankments. Before all the handshaking and back-patting had ceased, residents near the sprayed area began complaining the herbicide caused numerous instances of dead or dying trees, wilted pot plants and roses and garden vegetables twisted into grotesque shapes. One Live Oak resident, complaining his family suffered headaches, nausea and diarrhea after the defoliant was sprayed, said he was told by the city poison control center it was toxic. Mayor Harper admitted there was some damage but added "It was just an act of God." He was referring to a storm that passed over town the same day the chemical was applied. Harper said the wind picked up the chemical and blew it into nearby yards. City insurance carriers are investigating to see if any of the claims will be paid.

Five professional chain saws, replacement chain and bars were donated by Pioneer to help clear debris from tornados that struck Omaha, Neb., May 6. The saws were given to public works department workers shortly after twisters killed three persons and devastated 800 square blocks in this city's southwest and northwest sections. Damage exceeded $500 million and hospitals treated 140 injured persons. "The destruction was awesome," Ed Molaskey, Pioneer field sales manager, said. "Homes were ripped apart, trees and power lines uprooted and large trucks twisted around telephone poles." Pioneer offered the saws to Mayor Edward Zorinsky with assistance from Mayor Sam Schwartzkopf of nearby Lincoln, Neb., the U.S. marketing headquarters for Pioneer.

Say: "Gypsy Moth"

. . . and every arborist in the United States knows what you are talking about, whether he is in a high infestation area or has never seen one.

For the past five years Chuck Cissel, Vice President of Guardian Tree Experts, has been working closely with Dave Shaw, Shade Tree Commissioner of Monmouth County, New Jersey, and Dr. Lou Vasvary of Rutgers University testing Mauget Tree Injectors charged with Meta-Systox R and Bidrin in the control of gypsy moth. This New Jersey area relives "January in June" each year as a result of the voracious feeding of the larva of this pest stripping the leaves from trees.

While it will not be practical to treat large tracts of land this way, individuals who do not want to spray due to any number of valid reasons will have a viable alternative if this method is labeled for use as a result of the outstanding test results that have been gathered. With a sealed system such as Mauget Injectors, there is no drift, runoff, or wind and weather factors to consider. Killing effectiveness averages 30-60 days, and one minor miracle yet unexplained is the fact that it is very noticeable the following year that the moths seem to "bypass" trees injected the previous year.

Test data accumulated over the past five years indicate that an average of 90% control can be safely expected. While it is not the answer to everybody's problems, the professional arborist will be able to add another item to his medicine chest to fight the ills that plague his clients' shade trees.

(From left) Dr. Lou Vasvary, Chuck Cissel, Dave Shaw and Lew Kolb. Note: Injectors on tree in front of Vasvary.

DURSBAN INSECTICIDE

Bug off mosquitos, Dow Mosquito Fogging Concentrate is here.

If mosquito control is the problem, chances are Dow Mosquito Fogging Concentrate is the solution. Check the advantages: Recommended for use in thermal or cold fog ground application units. Effective at very low rates thus eliminating excessive refills. Controls many species of mosquitos, including those tolerant to malathion. Also, it doesn't corrode equipment or damage paint when used as directed. All of which make Dow Mosquito Fogging Concentrate the choice of mosquito abatement districts and professional park and ground maintenance men everywhere. Dow Mosquito Fogging Concentrate. Bad news for mosquitos. Good news for you. Just remember to read and follow all precautions on the label. Ag-Organics Department, Midland, Michigan 48640.

DOW*

DOW CHEMICAL U.S.A.

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It's the professional's professional from Dow.

Reel winners.

No matter if you want to mow a field or a fairway, Dan Boyd of Boyd Distributing Co., Inc. in Denver can get you into the kind of equipment you need to do the job best.

Just like the rest of us Jacobsen Distributors, Dan has made it a point to know more than enough about turf care to be pretty expert at it.

That's one of the reasons he carries Jacobsen gang mowing equipment. He knows, for example, that your mowing area will dictate the number of gangs, the type of reels, the right kind of wheels, the height of cut, the fineness of cut, and the speed at which you want to get your mowing done. Because of his complete line to choose from he's able to sell you what you need rather than just what he's got.

To be specific, Jacobsen Fairway gang mowers give you a choice of three different wheel styles (steel semi-pneumatic and pneumatic); six-blade standard or 10-blade high-frequency units for carpet-smooth cuts. And 3, 5, 7, 9, 11, or 13-gang combinations, with adjustable cutting heights ranging from ⅜" to 3½".

For Blitzer applications in other than fine turf areas, you have the same choice of wheels. You get bigger 10" reels with either four or five blade units; 3, 5, 7, 9, and 11-gang combinations that mow up to a 25'10" swath. And cutting heights of 1" to 3½".

In all cases, the sealed housing design means you only have to lubricate just once a year. What could be easier?

There are many more features you'll want to know about. Contact your Jacobsen Distributor about your gang mowing problems.

He'll show you a reel winner.

Your Jacobsen Distributors

Before we sell it, we buy it.

For the name of the distributor near you write: Jacobsen Turf Directory, 1721 Packard Avenue, Racine, Wisconsin 53403

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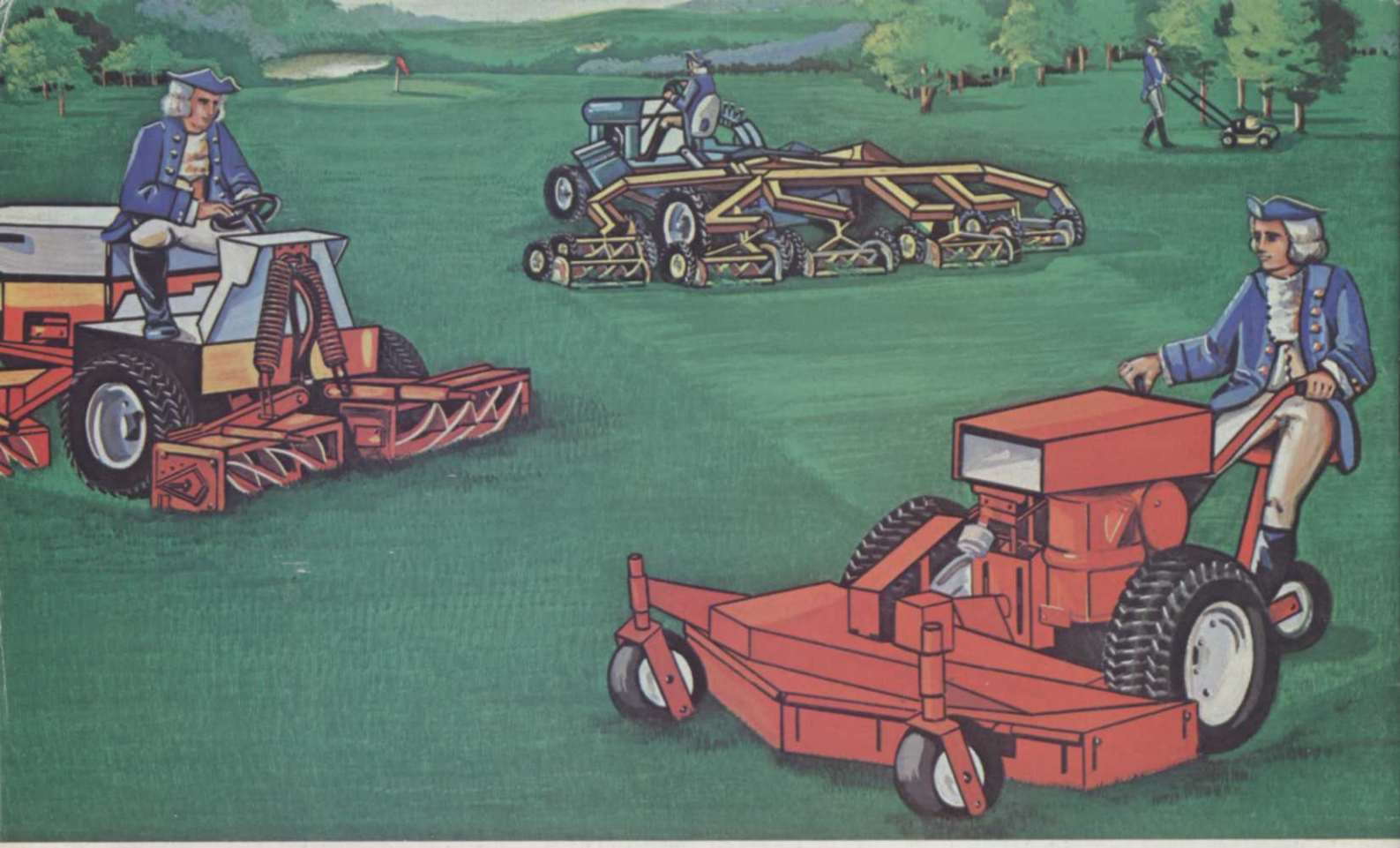
◀ For ad on preceding page Circle 110 on free information card

For ad on following page Circle 139 on free information card ▶



NO MATTER HOW YOU CUT IT YORKTOWN MAKES HISTORY

Yorktown*

Turf-Type Perennial Ryegrass

As a professional turf specialist, you know that even with a newly sharpened mower, all grass varieties **do not** mow the same. With a mower in good condition, you'll find the mowing quality of Yorktown to be unequaled. Yorktown mows evenly, without serrated edges. This leaves a greener swath with the least amount of stress on the plant.

Now you can have a turf-type perennial ryegrass that stays green not only in front of the mower, but after it is mowed as well. . .and Yorktown stays greener longer.

When tested against 15 other new and established varieties at a leading state university, Yorktown received the highest rating for overall turf quality. This time, "America Surrenders to Yorktown".

Although the new Yorktown Turf-Type Perennial Ryegrass is not yet available in large enough quantities to meet everyone's needs, you'll be glad you waited for your 1975 supply.

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